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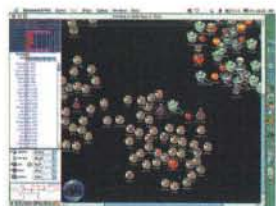
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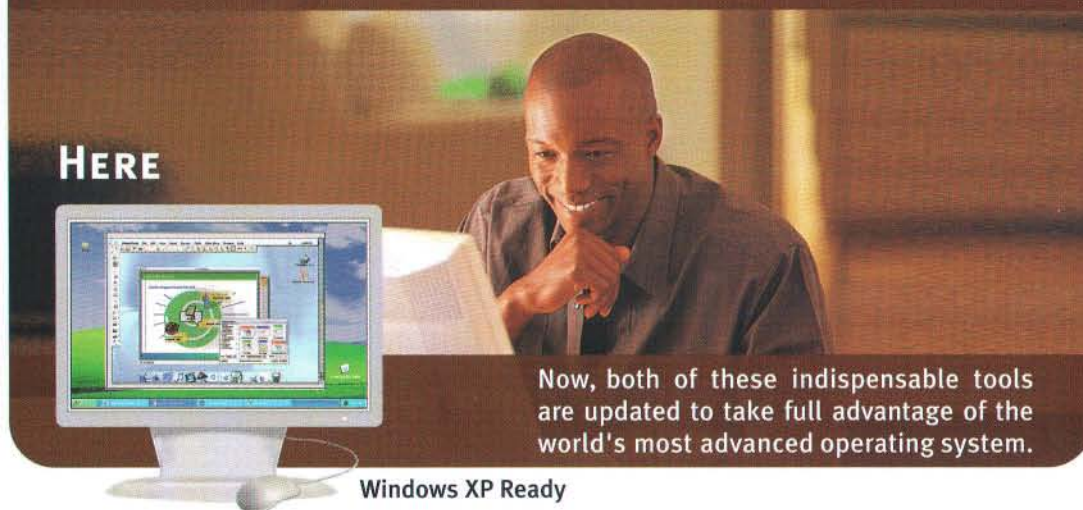
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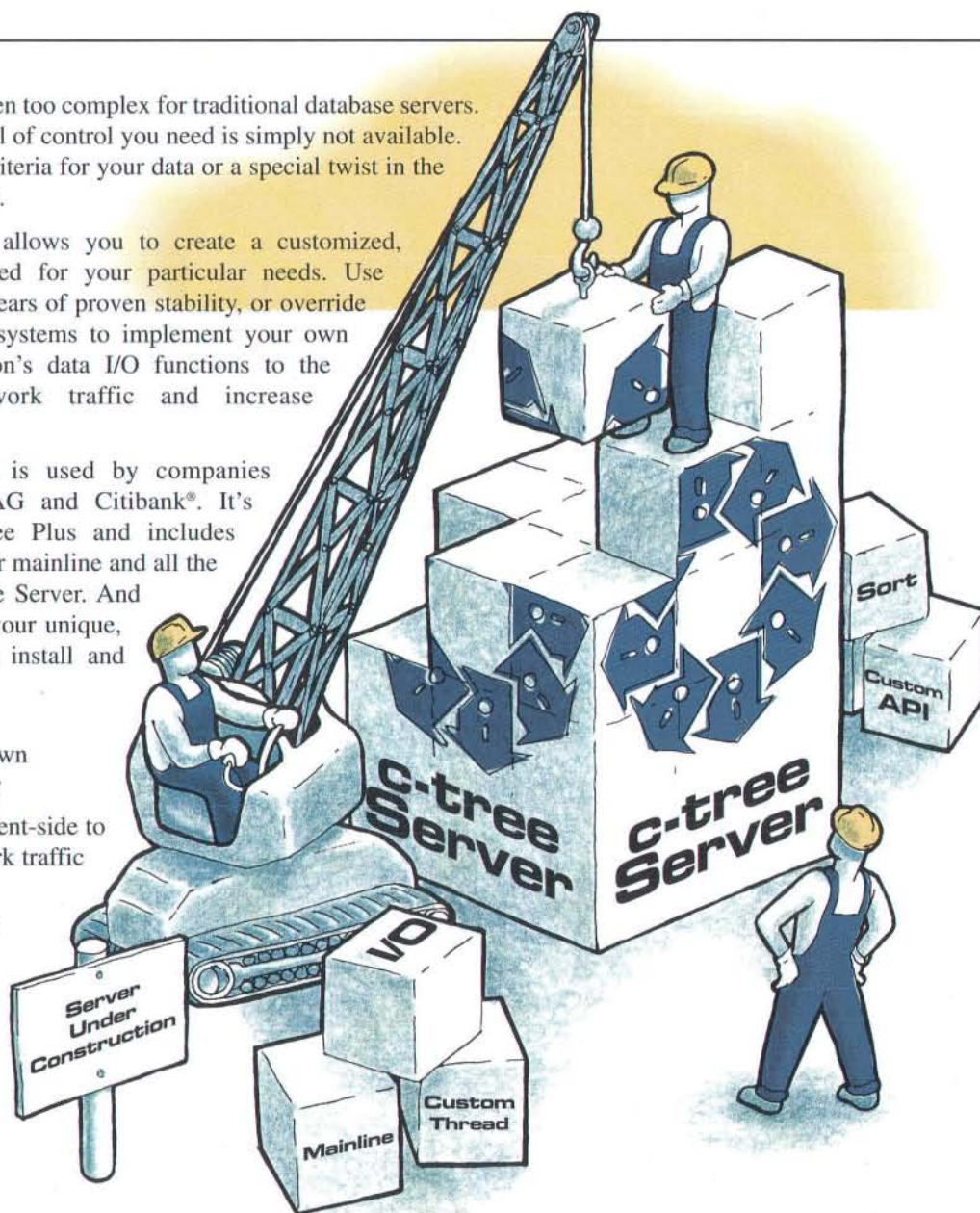
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C o n t e n t s

November 2003 • Volume 19, Issue 11

UNTANGLING THE WEB

14 Enabling the Embedded: PHP

We've covered CGI scripts, but how is PHP any better?

By Kevin Hemenway, Statutory Relevance

GETTING STARTED

6 Xcode and Code Completion

By Dave Mark, Editor In Chief

SECTION 7

30 File System Security

How (not) to make OS X as secure as MS Windows...

By Rich Morin

REVIEWS

74 VisualRoute

Java tool for graphically displaying traceroute information

By Chris Kilbourn

CASTING YOUR .NET

64 Up and Running with the SSCLI

Exploring .NET development on Mac OS X

By Andrew Troelsen, Minneapolis, Minnesota

MAC OS X PROGRAMMING SECRETS

10 Building a System Preference Pane

By Scott Knaster

BOOK REVIEW

78 Cocoa Recipes for MacOSX

By Ron Davis

GIFTS FOR GEEKS!

32 Remote

Dave becomes the couch potato we all wish we could be

34 Point

Apple Wireless Mouse

36 Hear

Audio goodies to please the ear

38 Toys

Cool toys for grown up, and not so grown up, geeks

40 Gadgetry

Just cool and interesting stuff to give or get

44 See

If seeing is believing, then believe these are great gifts

48 Share

The gadgets to help you share those moments of life

52 Play

Fun time

54 Wear

Look cool while giving all the great geek gifts

PATCH PANEL

20 Printer Usage Reports with AppleScript and CUPS

Finding out who's printing what in Mac OS X

By John C. Welch

SOFTWARE MARKETING

56 Turn Your Web Site into a Marketing Machine

Web Page Essentials for Promoting Your Software

By Dave Wooldridge

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Xcode and Code Completion

This month, we're going to take a look at Xcode's code completion feature. As you'll see, code completion is much like the behavior you see in your browser when you start typing a URL and the browser does its best to save you the keystrokes by filling in the closest match it can to complete the URL. But Xcode's code completion is much more than that. Follow along and you'll see what I mean.

As we've done for the past few months, we'll work with the *Sketch* sample project. As a reminder, the *Sketch* files live in */Developer/Examples/AppKit/Sketch/*. Before you open *Sketch*, make a copy of it. We *will* be breaking it!

Launch Xcode and open your copy of the project *Sketch.pbproj*.

SETTING CODE COMPLETION PREFS

Before we dig into code completion itself, let's take a look at the code completion preferences. Select *Preferences...* from the *Xcode* menu, then click on the *Navigation* icon in the scrolling pane at the top of the Preferences window (Figure 1).



Figure 1. Xcode Preferences, the Navigation Pane.

Your very first course of action is to make sure the *Enable Indexing* checkbox is checked. The *Enable Indexing* checkbox tells Xcode to constantly index your project in the background as changes are made. An updated index is what makes project searches so lightning quick. Since the index is maintained in the background, the overhead is hardly noticeable. If you turn indexing off, code completion, search, and anything else that depends on the index will slow considerably. Alternatively, if you have a very large project that was never indexed, you might not want to turn on indexing if you just have a few small changes to make. No sense waiting for the index to be built if you won't be taking advantage of it. In general, I *always* start off with indexing turned on.

Next step, check the *Enable Code Completion* checkbox. Obviously, this enables code completion.

There are a series of checkboxes and radio buttons that are enabled once you enable code completion. The first of these, *Automatically suggest matching option*, is what does the auto-complete as you type. For example, if the constant *greenColor* was the only symbol in scope that started with a *g*, you might type *g* and Xcode might add a grey *reenColor*.

When there is more than one symbol in scope that matches the current typing, Xcode will build a list of all the matching options. This is called the *option list*. As you type, if there is more than one matching symbol, Xcode will display a grey ellipsis (...). Anytime you see this ellipsis, you can hit the *Code Sense Complete* key (see Figure 2 for the *Code Sense Complete* key binding - the default is *F5*) and the option list will popup allowing you to select from a list of matching options.

The *Automatically popup option list* checkbox is a bit of a puzzle to me. The sense I get is that this option controls whether the option list popup appears whenever you start typing a symbol and there is more than one match. If the checkbox is unchecked, you have to type *F5* (or whatever the *Code Sense Complete* key binding is set to) to bring up the popup. If that is the case, then this option is broken, as it behaves the same whether this checkbox is checked or not. I've got a question in to Apple on this, but haven't heard back yet. I'm guessing this is a bug and will be fixed in the next Panther release.

Dave Mark is a long-time Mac developer and MacTech contributor. Author of more than a dozen books on various Mac-development topics, Dave is all about Xcode these days. Last month's column took the debugger through a few of its paces. This month's installment will focus on code completion.

The next item in the prefs dialog is the *Tab key selects the current item* checkbox. It allows the tab key to both bring up the *option list* popup and make a selection from the popup. I find this option intuitive. Play with it, both on and off, but I'd definitely leave it checked.

Next is the *Contains only items matching word* checkbox. If checked, the *option list* popup will contain only symbols that exactly match what you've typed so far. If it is unchecked, the list will contain matching items and then a few more, either before or after the matching items in the symbol list. Play with this and you'll see what I mean.

Next is a radio button set labeled *Option list shows methods/functions* as: with buttons for *Name only* and *Name and arguments*. This option set lets you specify whether methods/functions listed in the *option list* popup are listed just by name, or with arguments.

The next radio button set, *Completed method/function inserted as:*, lets you specify whether the selected method/function is inserted in your code as just the name or with argument placeholders.

The rest of the *Navigation* prefs pane lets you determine what types of symbols are included in the editing window's function popup and whether the function popup is sorted alphabetically or by the order the symbols appear in the source file being edited.

We'll take a look at some examples that should make all these options a bit clearer. But first, we'll take a quick look at the key bindings prefs.

CHANGING THE KEY BINDING

You can change most, if not all of the key bindings that ship with Xcode. Go to the *Xcode* menu, select *Preferences...*, then click on the *Key Bindings* icon. Now click on the *Text Key Bindings* tab (**Figure 2**.)

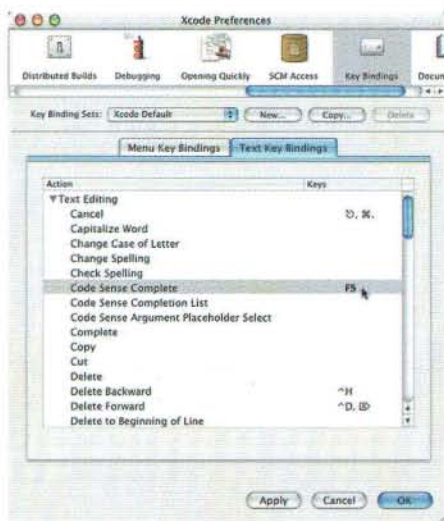
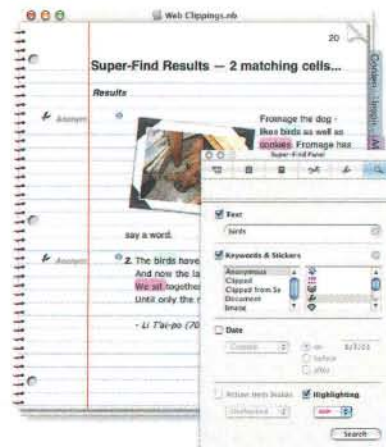


Figure 2. Changing the Code Sense Complete key binding.

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The text key bindings are sorted into functional sets, like *Text Editing*, *Cursor Movement*, and *Text Formatting*, each with its own disclosure triangle. Open the *Text Editing* triangle. Under the c's, you'll find *Code Sense Complete*. In the *Keys* column, you should see the key binding *F5*. To change this to some other key, double-click on the *F5*. Assuming you are playing with your bindings for the first time, you'll see the dialog shown in **Figure 3**.

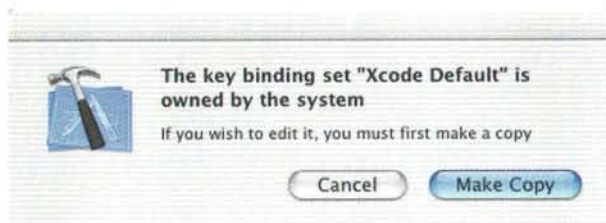


Figure 3. Making a personal copy of the Xcode key binding set.

Click *Make Copy* to create your own copy of the the Xcode key bindings. I named mine *Dave's Bindings*. Make all the changes you like to those, then use the popup menu at the top of the pane, labeled *Key Binding Sets*, to select *Xcode Default* (See **Figure 4**), if you ever need to go back to the original settings. You'll also find built-in key sets for *BEdit*, *CodeWarrior*, and *MPW*.



Figure 4. The key binding sets that ship with Xcode.

The key binding labeled *Code Sense Completion List* pops up the *option list*, even if there is only a single item on it. More importantly, the key binding labeled *Code Sense Argument Placeholder Select* jumps to the next argument placeholder in your just completed code. We'll demo this in a minute.

Add a key binding for this one. Double-click in the *Keys* column to the right of *Code Sense Argument Placeholder Select*. When the edit field appears, type in your key binding. Most folks use control-slash (^/) for this one.

TAKING CODE COMPLETION FOR A SPIN

Let's take a quick look at code completion in action. I'm editing the file *SKTGraphic.m* in the *Sketch* project. Remember to make a copy of the project before you mess around with it, just so you don't break it.

I'm going to add this line of code to the project:

```
[self setBounds:NSMakeRect(0.0, 0.0, 1.0, 1.0)];
```

Since we're not concerned with compiling this code, feel free to type this line anywhere you like. Start at the beginning of a new line by typing the beginning of the line:

```
[self setBounds:NSMake
```

Note that I typed *NSM* in all caps, as opposed to *nsm*. This is because I have the *Matches using case-sensitivity* checkbox checked in the *Navigation* prefs.

Figure 5 shows where we are at this point. Notice the ellipsis (...) that follows the *NSMake*, telling us that there are some matching options. If there was only one, the option would be filled in in grey.

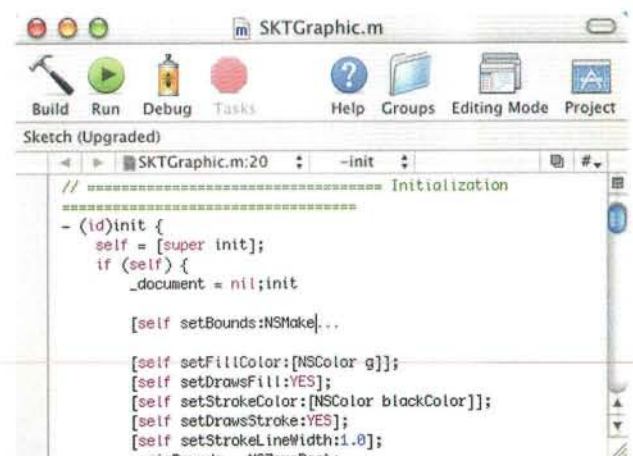


Figure 5. The start of *NSMakeRect* code completion.

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Now press *F5* or *tab* to bring up the *option list* popup. **Figure 6** shows the popup with the *Contains only items matching word* checkbox checked. I pressed the arrow key twice to select *NSMakeRect*, then pressed *tab* to add *NSMakeRect*, and its argument placeholders, in the code.

```

1 NSPoint NSMakePoint(float x,float y)
2 NSRange NSMakeRange(unsigned int loc,unsigned
3 NSRect NSMakeRect(float x,float y,float w,float
4 NSSize NSMakeSize(float w,float h)

```

Figure 6. The option list popup for *NSMake*.

Here's the code at this point:

```

[self setBounds:NSMakeRange(<#float x#>,<#float
y#>,<#float w#>,<#float h#>)

```

Note that each argument is marked by a placeholder between matching angle brackets and pound signs. The four arguments are *x*, *y*, *w*, and *h*. The first placeholder is selected. I want the first argument to be *0.0*. I type it, then press control-slash (^/) to select the next placeholder:

```

[self setBounds:NSMakeRange(0.0,<#float y#>,<#float
w#>,<#float h#>)

```

I continue typing arguments and pressing ^/ until my statement is complete:

```

[self setBounds:NSMakeRange(0.0,0.0,1.0,1.0);

```

TILL NEXT MONTH...

I really like this method of argument selection. It works well for me. As you've seen over the last few months, the move from Project Builder to Xcode is a quantum leap forward. I really like the attention to detail, such as the depth of preference settings on the *Code Sense* and *Key Bindings* panes. And you just know that as much as compilation performance has improved from Project Builder to Xcode, there are dramatic improvements still to come...☺

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By Scott Knaster

Building a System Preference Pane

Most applications include a Preference item in their application menu that lets users tweak the way things work. In fact, the very program I'm using to type these words includes a vast set of preferences with over 100 settings divided into ten categories. Even the Finder includes its own preferences.

Sometimes, little bits of software need to have preferences, but are not substantial enough to easily provide a user interface for them. These can include parts of the system, such as the Dock or the built-in Screen Effects, or cool third-party utilities. In Mac OS 9, users often tweaked these settings in control panels. As with so many things, the preferences world has changed radically since those bygone days. Mac OS X provides a System Preferences application that includes preference panes for these assorted but important system settings.



Figure 1. System Preferences window.

OS X comes with a bunch of preference panes used for system settings, as you can see in **Figure 1**. But in addition, System Preferences (since OS X 10.1, anyway) provides a plug-

in framework that you can use to create your own preference panes that appear in the System Preferences window right alongside the system's built-in panes.

For this month's column, I'm borrowing code and the concept from Joe Zobkiw's cool new book, **Mac OS X Advanced Development Techniques**. This book provides real code and information about a nifty collection of OS X topics, including applications, system services, multiple threads, and more. If you want to read a fun, well-written book that will broaden your knowledge of OS X programming topics, check it out.

THEY THOUGHT OF THIS

For our sample in this column, we'll create a simple preference pane called BigPane that has a checkbox and a text field. To get started, crank up Project Builder and choose New Project from the File menu. When you get the New Project Assistant, take a look under the Standard Apple Plug-ins section. Hey, there's a project type called PreferencePane! By choosing that one, we get a project that's already hooked up to the preference pane framework. We'll go ahead and create our new preference pane project.

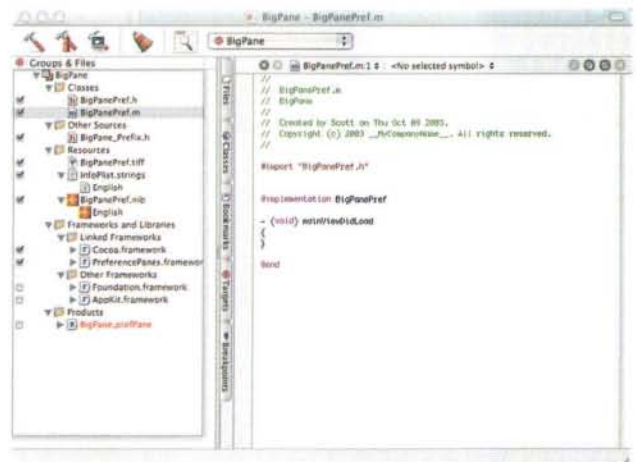


Figure 2. New, empty preference pane project..

Once the project has been created, we can move forward with the primary task of writing the code. The empty project

Scott Knaster has been writing about Macs for as long as there have been Macs. Scott's books *How To Write Macintosh Software* and *Macintosh Programming Secrets* were required reading for Mac programmers for more than a decade. Scott wrote developer books for General Magic and worked on Mac software for Microsoft. Scott's books have been translated into Japanese and Pascal. Scott has every issue of Mad magazine, which explains a lot.

declares `BigPanePref`, a subclass of `NSPreferencePane`. The listing follows:

```
@interface BigPanePref : NSPreferencePane
{
    CFStringRef m_appID; // our application ID

    IBOutlet NSButton *m_checkBox;
    IBOutlet NSTextField *m_textField;
}

- (IBAction)checkboxClicked:(id)sender;

@end
```

Here we're simply declaring the class, including a string to hold the application ID so we can find our preferences file, references to the controls that are included in the pane, and the `checkboxClicked` action that we'll implement.

FIRST THINGS FIRST

Getting into the actual code, the first thing we'll deal with is overriding `initWithBundle`, which is called when the preference pane starts up.

```
#import "MyPreferencePanePref.h"

@implementation MyPreferencePanePref

- (id)initWithBundle:(NSBundle *)bundle
// System Preferences calls this method when
// the pane is initialized.
{
    // Initialize the location of our preferences
    if ((self = [super initWithBundle:bundle]) != nil) {
```

```
        m_appID = CFSTR("com.knaster.bigpane");
    }

    return self;
}
```

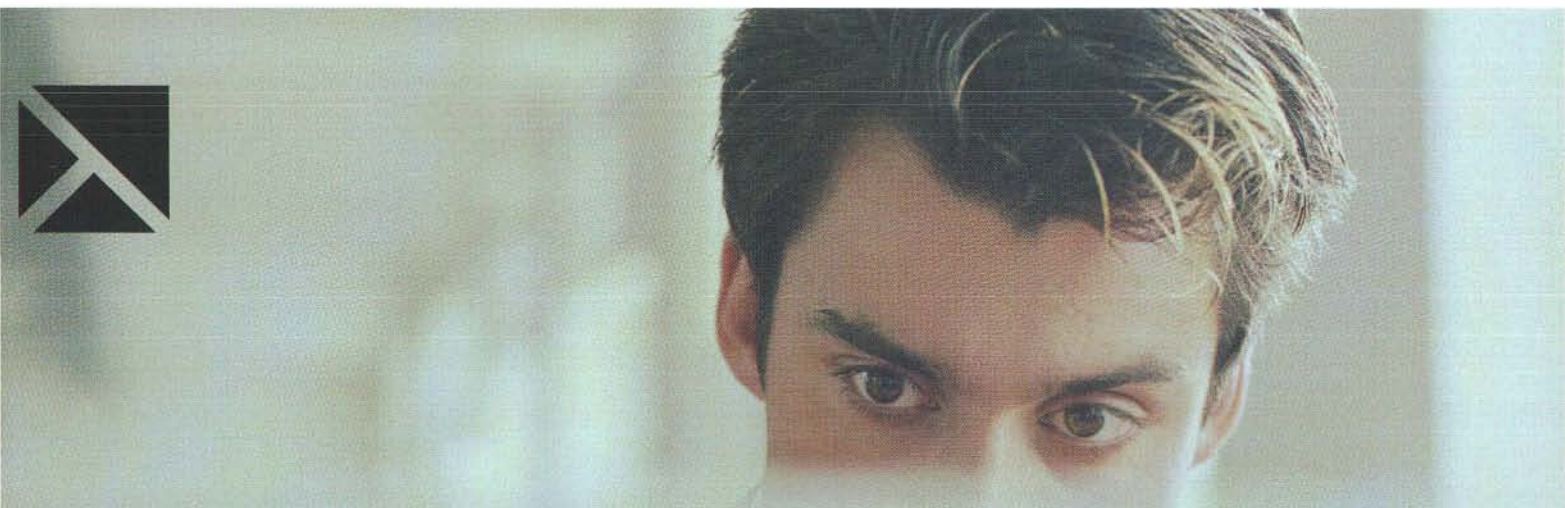
This override gets us the appID, which we'll use to locate the file that preferences are stored in. You should use a filename that is unlikely to be the same as any other file, and is named after the application or service whose preferences it contains. Also, because this is an init method, Apple says we should be good citizens and call the inherited implementation, which we do.

Once the view is created and the nib file is loaded, our `mainViewDidLoad` method will be called. This is where we get a chance to initialize the preference controls with their saved values:

```
- (void)mainViewDidLoad
{
    CFPropertyListRef value;

    // Get the value of the checkbox from the saved prefs
    // (if any)
    value = CFPREFERENCESCopyAppValue
(CFSTR("Boolean Value Key"), m_appID);
    if (value && CFGetTypeID(value) == CFBooleanGetTypeID())
    {
        [m_checkBox setState:CFBooleanGetValue(value)];
    } else {
        [m_checkBox setState:NO];
    }
    // Turn it off if we can't find a saved value
    if (value) CFRelease(value);

    // Get the contents of the text field
    value = CFPREFERENCESCopyAppValue
(CFSTR("String Value Key"), m_appID);
    if (value && CFGetTypeID(value) == CFStringGetTypeID()) {
        [m_textField setStringValue:(NSString *)value];
    }
```



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```

} else {
    [m_textField setStringValue:@""];
    // Make the string empty if there's no saved value
}
if (value) CFRelease(value);
}

```

In our override of `mainViewDidLoad`, we get the values of our two preferences (a checkbox and a text field, remember) from the file. We're getting some help from the cool Core Foundation Preference Services here. We call `CFPreferencesCopyAppValue` to get the values out of the file, and we use `CFGetTypeID` to ensure the values are valid. If not, we set the controls to default values. Continuing in our quest for good citizenship in case we have to run for governor some day, we release the value objects when we don't need them any more.

PREPARING FOR THE INVASION

Now that the pane is up and running and the controls have their values loaded, what happens when the user starts changing stuff? If the user clicks on the checkbox, we'll get a `checkboxClicked` message, so we'll override that method to change the associated preference at the same time:

```

- (IBAction)checkboxClicked:(id)sender
{
    if ( [sender state] )
        CFPreferencesSetAppValue(CFSTR("Boolean Value Key"),
                                kCFBooleanTrue, appID );
    else
        CFPreferencesSetAppValue(CFSTR("Boolean Value Key"),
                                kCFBooleanFalse, appID );
}

```

In this method, we're simply setting the value of the preference based on the state of the checkbox. We use the handy `CFPreferencesSetAppValue` call from Core Foundation Preference Services. Why don't we save the value of the text field this way, too? We could, by watching for various `NSText` messages, but it's probably sufficient just to save the text field when the user is done with the pane, which we'll do in `didUnselect`, coming up next.

Can you believe we're almost finished writing the code for our little sample? All that's left is the implementation of the `didUnselect` method:

```

- (void)didUnselect
// The system calls didUnselect when another pane is
// opening or the user quits System Preferences.
{
    CFNotificationCenterRef center;

    // Save the value in the text field
    // to our preferences file.
    CFPreferencesSetAppValue(CFSTR("String Value Key"),
                            [m_textField stringValue], m_appID);

    // Make sure the file is flushed and its contents written
    // to disk.
    CFPreferencesAppSynchronize(m_appID);

    // Broadcast a notification that preferences have
    // changed, in case Big Brother is watching.
    center = CFNotificationCenterGetDistributedCenter();
    CFNotificationCenterPostNotification(center,
    CFSTR("Preferences Changed"), m_appID, NULL, TRUE);
}

```

The main work of the `didUnselect` override is to save the contents of the text field to our prefs file, which we do by calling `CFPreferencesSetAppValue` and `CFPreferencesAppSynchronize`. Also, we call `CFNotificationCenterPostNotification` to send a notification to any interested code that our prefs have changed – probably, nobody cares, but you never know.

MORE DETAILS

Putting together the nib file and finishing the project are pretty straightforward. Using Interface Builder, just place the controls you're using – in this case, our check box and text field – in the window provided by the project. **Figure 3** shows how this looks in Interface Builder.

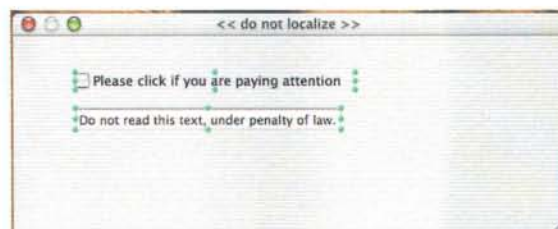


Figure 3. Our preference pane in Interface Builder.

Of course, when you're making your own preference pane, just arrange the controls and other user interface elements however you like. You can even add a tabbed view (`NSTabView`) to the window and place controls in multiple tabs. Your code doesn't know or care which tab contains a particular control.

Another neat trick is to add your own custom 32 by 32 pixel Finder icon for the pane. You can do this by putting your icon into the project's .tiff file – in our example, that would be `BigPane.tiff`. This file is automatically created by ProjectBuilder with the default light switch icon.

If you're building a preference pane as part of a real project, you'll want to include the pane in your installer. The pane should go into `~/Library/PreferencePanes`. When you're just practicing, you can drag the preference bundle there and install it yourself. If the System Preferences application is running, quit it and run it again. You should see your new preference pane listed in the "Other" ghetto at the bottom of the screen if you're viewing by category, and in proper alphabetical order otherwise. Note that you can't place your pane into an existing category, nor can you create new categories. Bummer. Maybe that ability will come in a future version.

SUMMING UP

This covers the basics of creating a system preference pane, so you should now be able to go forward with your plans for that awesome system service or other minimal-UI widget. If you want to learn more about this topic, or many other related cool OS X tricks, please check out *Mac OS X Advanced Development Techniques*, written by Joe Zobkiw and published by Sams Publishing Developer's Library. See <http://www.triplesoft.com/macosex/> to find out more.

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By Kevin Hemenway, Statutory Relevance

Enabling the Embedded: PHP

We've covered CGI scripts, but how is PHP any better?

In the past five months, we've turned on our built-in Apache web server, fiddled with the quick and dirty Server Side Includes (SSI), configured CGI to run scripts written in languages like Perl, Python, and Ruby (see also Jim Menard's article on Ruby, *MacTech*, March 2003) and, in general, found that this high-falutin' web serving stuff ain't all that difficult. However, we've yet to launch into a peaceful meandering of PHP, one of the easiest and more popular programming languages available for web development.

In the first of assuredly many self-congratulatory, pointless, and clichéd "personal milestone" articles, our amazing, exciting, over-the-top, and action packed *sixth* entry will... will... welp, it'll teach you about configuring and customizing PHP with your Apache web server. Quick, over there! Bearded lady! Vegas pole dancer! Scarily painted clown!

BUT FIRST, THE WHO... OH, LOOK! HISTORICAL REFERENCES!

As most developers know, it's hard to talk about a language without getting into religious wars ("my recursively-named is better than your yet-another!"), personal dislikes ("whitespace?! I can't believe Python considers it syntax!"), and programming theory ("procedural is to OOP as 'that's odd' is to 'eureka!'"). Regardless, there is one clear advantage to using PHP under Apache: "forking" (or rather, the lack thereof).

See, anytime a CGI script is requested, Apache *forks* (or *spawns*) a new process to handle this request, and then executes the code within this newly created environment. This happens pretty quickly and without fuss or muss, but with one downside: every time a process is spawned, the interpreter (be it Perl, Python, Ruby, etc.) has to be reloaded into memory—nothing is remembered or cached from previous runs. The more and more times this happens (due to heavy incoming traffic, for example), the slower the web server will get: Apache will spend more time waiting for processes to finish than actually serving their results.

This doesn't happen with Apache's Server Side Includes. Since SSIs are built into the web server via a default module called `mod_include`, everything is handled internally and no forking is required. This same approach is used with the `mod_php` module: by preloading PHP into each and every Apache process, you remove the need for the forking and interpreter loading overhead. The only downside is slightly larger memory, a trade-off worth taking.

Let's see how `mod_php` is configured within Apache.

ENABLING THE PHP MODULE WITHIN APACHE

As you'll see, configuring PHP under Apache is very similar to what we've seen in our previous articles—this stuff should be old hat to you by now. As we've been doing from the start, to find out more about a feature, we'll search for the keyword within the `httpd.conf` file. Our first matches for "PHP" are our familiar `LoadModule` and `AddModule` lines:

```
LoadModule php4_module      libexec/httpd/libphp4.so
AddModule mod_php4.c
```

Similar to our previous articles, these two uncommented lines (i.e., not prefaced with a `#` character) load the module located at `/usr/libexec/httpd/libphp4.so` into our Apache web server. You may notice that the module name doesn't match what we've grown to expect (`mod_include` for Server Side Includes, `mod_cgi` for CGI scripts, etc.), as it's called `libphp4.so` instead. There's nothing special about this... everyone calls it `mod_php` regardless of what the actual file representation is.

Our next "PHP" search research should also look familiar:

```
#
# To use PHP files:
#
AddType application/x-httpd-php .php
AddType application/x-httpd-php-source .phps
```

Similar to Server Side Includes, these two lines tell files ending with a `php` or `phps` extension to become associated with the PHP module. You'll notice there's no `AddHandler` equivalent like with SSI or CGI; largely, that's because the "application" of the MIME-type instructs `mod_php` to become their "handler". It's

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sort of like Adobe Acrobat Reader handling .pdf files (which have a MIME-type of `application/pdf`). If you've already designed your entire site around .html files and don't feel like revamping your structure or redirecting old URLs, you can modify the first line like so:

```
AddType application/x-httpd-php .php .html
```

This will enable support for PHP code in both .php and .html files. Be careful not to go nuts with this: you don't want to add file extensions "just because". Whether you actually use PHP code within an .html file or not, `mod_php` will process it like you did, and that can unnecessarily slow down your server when your traffic starts getting heavier.

With that, we've run out of search results in our `httpd.conf`—PHP has already been configured for our use. But how do we know for sure, besides attempting to run some PHP code and introducing varying levels of user error? To find out which third-party modules are loaded into your web server, check Apache's `error_log` where, for every startup, the "server tokens" will be logged. These tokens reflect the server version number, what operating system it's running on, and information on which third-party modules have been loaded.

Since we've been searching for "PHP" throughout the `httpd.conf`, let's do the same with our `error_log`. **Figure 1** shows the results of a `grep PHP /var/log/httpd/error_log` shell command, listing the server tokens each restart of our Apache server logged. `grep` is a great tool for quickly searching a file from the command line.

```
Terminal -- bash (typ) -- 119x36
[Thu Feb 6 20:05:10 2003] [notice] Apache/1.3.27 (Darwin) DAV/1.0.3 PHP/4.1.2 configured -- resuming normal operations
[Thu Feb 11 09:35:35 2003] [notice] Apache/1.3.27 (Darwin) DAV/1.0.3 PHP/4.1.2 configured -- resuming normal operations
[Thu Feb 13 10:52:15 2003] [notice] Apache/1.3.27 (Darwin) DAV/1.0.3 PHP/4.1.2 configured -- resuming normal operations
[Thu Apr 9 09:11:00 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Thu Apr 9 09:50:04 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Thu Apr 10 11:22:26 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Thu Apr 8 19:40:36 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Thu Apr 10 22:40:19 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Thu Apr 10 23:07:16 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Sun Apr 13 10:14:19 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Mon Apr 14 11:42:10 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Mon Apr 14 19:05:26 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Mon Apr 14 21:26:40 2003] [notice] Apache/1.3.27 (Darwin) DAV/1.0.3 PHP/4.1.2 configured -- resuming normal operations
[Mon Apr 14 21:26:55 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Sun Apr 27 16:59:05 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Sun Apr 27 19:04:42 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Mon Apr 28 22:05:36 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Thu Apr 29 08:14:59 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Wed Dec 31 19:00:59 1999] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Thu May 6 10:00:29 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Thu May 6 10:00:40 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Thu May 6 10:02:02 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Thu May 6 10:05:01 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Wed May 7 07:57:06 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Mon May 12 21:01:06 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Mon May 19 11:07:10 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Mon May 19 11:20:45 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Mon May 19 11:33:23 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Sun May 25 10:10:12 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Mon Jun 9 22:04:11 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Wed Jun 11 21:56:24 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Mon Jun 23 00:32:29 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Fri Jul 4 15:21:20 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Wed Jul 9 00:32:54 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Wed Jul 9 07:43:40 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
[Wed Jul 9 23:59:57 2003] [notice] Apache/1.3.27 (Darwin) PHP/4.1.2 configured -- resuming normal operations
```

Figure 1: Grepping our `error_log` for Apache's server tokens.

Now that we know PHP is enabled, let's learn more by writing our first script.

FAR MORE PHPINFO() THEN YOU'VE EVER WANTED

Since PHP has been enabled for any file that ends with .php, we're going to create a `test.php` file within our personal user

directory (`/Library/username/Sites/`). The contents of this file will be simply:

```
<? phpinfo(); ?>
```

Any PHP code you write will need to be sandwiched within a starting and ending delimiter, `<?>` and `?>` in this example. You may also see and use starting delimiters like `<?php` (often recommended for greater portability over the shorter `<?>`), and `<?=>` (which can be used to quickly echo a variable or expression). With our delimiters in place, we'll use one of PHP's built-in functions, `phpinfo()`, to spit out gobs of information about our installation. **Figure 2** shows partial output of `http://127.0.0.1/~username/test.php`:

The screenshot shows a web browser window with the address bar displaying `http://127.0.0.1/~morbus/test.php`. The page content includes a table of system and configuration details, followed by a section titled "PHP 4.0 Credits" and a table of PHP Core configuration directives.

Directive	Local Value
<code>allow_call_time_pass_reference</code>	On
<code>allow_url_fopen</code>	1
<code>always_populate_raw_post_data</code>	0

Figure 2: The first page of `phpinfo()`'s many.

Obviously, there's a lot of stuff here, and a good portion of it won't be immediately (or even ever) useful, but there are a number of interesting things to discover. I'll touch briefly on a few of the more helpful entries below, but you can always find out more by searching through the online documentation at <http://www.php.net/>.

- The **first section** we come across gives us the version number of PHP (which we previously saw in the output of our `error_log`), the time the module was built, and more importantly, **the configuration line used to build it**. This becomes helpful if we ever build our own version of the

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module, adding a new feature or tweaking an existing one. Also helpful is the **configuration file path**, which tells us where the `php.ini` file lives (or *should* live). The `.ini` file is similar to Apache's `httpd.conf` and allows us to tweak the runtime settings of the module.

- Next up is a long list of configuration directives. **`asp_tags`**, off by default, allows you to use `<%` and `%>` as your delimiters, whereas **`short_open_tag`** controls whether you can use the `<?` we've already encountered. **`display_errors`** should ultimately be turned off when we're ready to use PHP on a production system, and any errors configured with **`error_reporting`** should be sent to an **`error_log`** instead (though we'll use **`log_errors`** to send them to our Apache **`error_log`** — confused yet?). Whether incoming data will automatically be escaped for database use is **`magic_quotes_gpc`**'s intent; since it's on by default, we'll have to be careful to **`stripslashes`** if we use the data elsewhere. Finally, **`register_globals`** will ensure that visitors or users can't easily pollute your namespace with GET or POST parameters, though some programs (most notably, the excellent osCommerce, <http://www.oscommerce.com/>) require it to be turned off.

With PHP certifiably enabled, let's configure it to log errors into our Apache **`error_log`**. Knowing about errors is always a very good thing, and by enabling all of them, we'll be able to write better scripts (similar to the Perl equivalents **`strict`** and **`warnings`**; see last column). To do this, we'll have to modify the `php.ini` file which lives in `/usr/lib/`.

TWEAKING PHP'S INITIALIZATION

There's one problem with editing this file: it doesn't exist. Since PHP is currently configured with all the standard and expected defaults, Apple never shipped a dummy `php.ini` file for us to modify. This isn't cataclysmic... most of the settings we care about can be modified in the relevant PHP file itself. Take, for example, the following two scripts:

```
script example #1:
<?php humiliation: ??

script example #2:
<?php error_reporting(E_ALL); humiliation: ??
```

Their combined output can be seen in **Figure 3**. As is obvious, there's an error in the code, but only when reporting is enabled would we actually be informed—meanwhile our script would trudge on regardless, perhaps getting deeper and deeper into a well of cascading problems. Further error configuration is possible by using the `ini_set` function to set relevant values, but who wants to worry about doing that for every `.php` file?

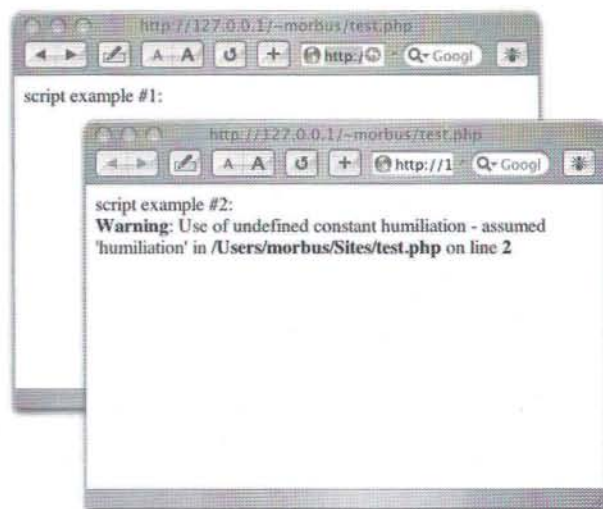


Figure 3: Our PHP script, with and without error reporting.

Our first task, then, is to create a `/usr/lib/php.ini` file. Thankfully, we don't have to build one from scratch, as the latest and greatest default version is available from CVS: <http://cvs.php.net/co.php/php-src/php.ini-dist>. If you're new to PHP or security-conscious (rightfully so), it may be better to blindly trust the more secure version, available from <http://cvs.php.net/co.php/php-src/php.ini-recommended>. Both are heavily commented and should be read fully to understand their ramifications.

For our purposes, we're going to use the `php.ini-recommended` file. It's always best to start with the most secured installation you can, then slowly open it up when you know what you're doing. The side effect of using this version is, happily enough, logging exactly how we want: none to the browser, everything to the **`error_log`**. Save the `php.ini-recommended` file to your Desktop, open a Terminal, and type the following:

```
cd Desktop
sudo cp php.ini-recommended /usr/lib/php.ini
sudo apachectl restart
```

Since `/usr/lib/` is a protected directory, you'll need temporary super-user privileges to copy the new configuration into place. That's where **`sudo`** comes in. Likewise, since we're making a change to PHP, which is loaded as part of the Apache web server, we'll need to restart Apache with **`apachectl`**, which also assumes super-user privileges. Any time you make a change to `httpd.conf` or your new `php.ini` file, you'll need to restart Apache before the changes will take effect.

You can ensure your configuration changes are enabled by checking the output of **`phpinfo`**, as well as running the first of our script examples. The browser output will remain unchanged, but the error will be logged into Apache's **`error_log`**—see **Figure 4**.

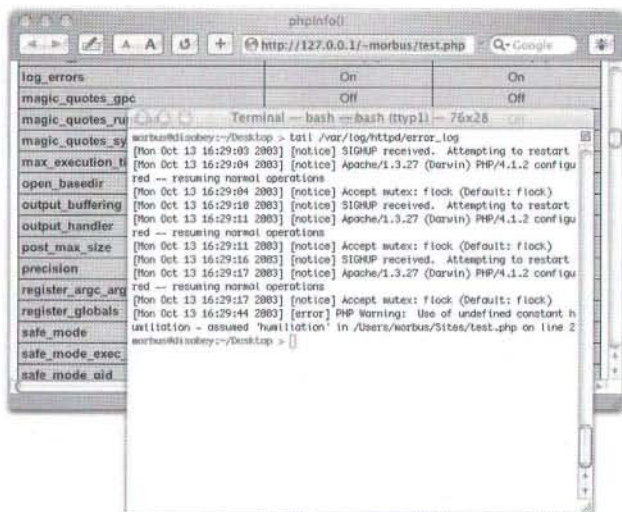


Figure 4: With our new `php.ini` file, errors are logged to Apache's `error_log`.

With our new `php.ini` file working correctly, you'll want to keep in mind that **register_globals** is off (and you may have to turn it on for some applications to work properly), **magic_quotes_gpc** has been disabled, so that you'll need to addslashes if you plan on putting content into a database, and that included files and libraries can only exist in the current directory (although you can add more lookups via **include_path**, which previously had include `/usr/lib/php`).

HOMework MALIGNMENTS

In our next column, we'll take a look into databases, specifically the MySQL server, and how to integrate our PHP scripts with them. Because it's so easy to use PHP to hook into any database, you'll often be hard-pressed to find a script or application that doesn't require the existence of one. Also, with Panther available by the time you read this, we'll cover any relevant differences in your web serving capabilities. For now, students may contact the teacher at morbus@disobey.com.

- I missed an opportunity to say "stick a fork in it; it's done".
- If you're looking to pick up a book on developing sites with PHP, check out **PHP and MySQL Web Development** by Luke Welling and Laura Thomson. The Second Edition is available from Sams Publishing and covers programming in PHP, fiddling with your first database and SQL statements, and then combining the two together to create a number of different applications to learn practical techniques from.
- You may have noticed that the PHP shipped with OS X is only 4.1.2, even though, at time of writing, 4.3.3 is available. If you absolutely must be using the latest version, be sure to check out Marc Liyanage's downloadable package available from <http://www.entropy.ch/software/macosx/php/>. It's full of features not enabled in Apple's version (compare <http://www.entropy.ch/software/macosx/php/test.php> to ours), and is easily removable for when you want to take a step back to the defaults.

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By John C. Welch

Printer Usage Reports with AppleScript and CUPS

Finding out who's printing what in Mac OS X

PRINT LOGS

One of the biggest issues for any network administrator is dealing with print accounting. Now, with Mac OS X server, you have the tools to deal with printer accounting, and Mac OS X Server 10.3 should give you even more tools for managing printers, and printing. But what about folks who are just sharing a printer from Mac OS X? One could argue that in this case, you don't need to manage your printer access at the same level that you do in a server-based network. However, for many small companies, or small networks that share printers, it's good to be able to know who is printing what and how much paper they are using. It's also a neat exercise for AppleScripters, and sometimes, just doing something in a way that most people wouldn't think to, and having it work, is pretty cool in and of itself.

Again, if you are looking for brilliance in AppleScript, talk to people like Sal Soghoian, or Bill Briggs, or Paul Berkowitz. I, like any other programmer or scripter, do things the way they make sense to me. If you can, as has happened in the past, rework my code and get huge efficiency gains, etc. out of it, by all means do so, and send it back to me. I can use the help! I also realize that there are a half dozen shell utilities that I could use to make this a LOT faster, and simpler. But then, I wanted to do this entirely in AppleScript, and so, have to live with its rather anemic text processing abilities. (Yes, yes, Perl folks can feel rightly smug. But I can script Photoshop, so nyah!)

So the object of this script is to process the printer logs that are created by CUPS when you print in Mac OS X, and output a number of things as a tab-delimited text file, giving you the option to then open it in Microsoft Excel or Filemaker Pro, or just leave it where it is. The text file lists the total number of printers, total number of users printing to those printers, total number of

pages printed through that machine, total number of pages per printer, and total number of pages per user. Since this script uses CUPS, it obviously requires at least Mac OS X 10.2 or later.

The CUPS log

Since we're talking about the CUPS log, we should take a quick look at it. Every time you print in Mac OS X, the CUPS printing system records the printer name, the user name, the page count for each page in a job, the date/time stamp for each page, the page number, the total number of pages, optional billing information, and the name of the host that sent the job to the host acting as a server to the printer. The printer in this case doesn't have to be a physical printer. If you have Adobe Distiller 6 installed, it also logs jobs sent to the "Adobe PDF" printer, even though it only creates PDF files.

In a Mac OS X system, the log file we are using is the `page_log` file, stored in `/var/log/cups/`. While you can't easily modify that file without using `sudo`, or `su`, anyone can read the file, so this script can be run by any valid user on an OS X system. A sample of the log file from my machine is shown below.

Printer name	user	job id	Date/Time stamp	page/copy #s	acct.host
HP_LaserJet_8150_Series2	jwelch	16	[08/Oct/2003:10:34:58 -0500]	1 1	- localhost
HP_LaserJet_8150_Series2	jwelch	16	[08/Oct/2003:10:35:00 -0500]	2 1	- localhost
HP_LaserJet_8150_Series2	jwelch	16	[08/Oct/2003:10:35:01 -0500]	3 1	- localhost
HP_LaserJet_8150_Series2	jwelch	16	[08/Oct/2003:10:35:02 -0500]	4 1	- localhost
HP_LaserJet_8150_Series2	jwelch	16	[08/Oct/2003:10:35:04 -0500]	5 1	- localhost
HP_LaserJet_8150_Series2	jwelch	16	[08/Oct/2003:10:35:06 -0500]	6 1	- localhost

This is from a 6 page job, printed to an HP LaserJet 8150, by me. The printer is on an AppleTalk connection to my machine. So going field by field, we see the printer name is "HP_LaserJet_8150_Series2", the user sending the print job is "jwelch", the job id is "16", the Date/Time stamp tells us this job was printed on October 8, 2003, around 10 am, there were 6

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See Dick. See Dick run his business with software that wasn't written and designed for his Macintosh. Poor Dick.

A moment of silence for Dick, please. A good guy with a good small business, but his accounting software was one of those PC transcription jobs, not pure MAC like MYOB AccountEdge and MYOB FirstEdge.

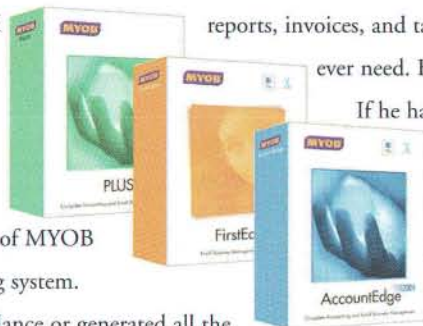
If only he'd known about the amazing capacity of MYOB software to bring out the best in his MAC operating system. He could have tracked and managed finances at a glance or generated all the

reports, invoices, and tax documents that he and his accountant would ever need. He could have spent more time with his clients.

If he had only known that MYOB develops the world's best selling MAC small business management software for lots of good reasons, this story might have had a happy ending. Sorry Dick.

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pages for one copy, (note that if the printer doesn't have a "mopy" function, or multiple copies per job, this is always 1), the accounting field is a "-" since by default, Mac OS X doesn't include this information, and since this job was sent to my computer by my computer, the host name is "localhost". In the page_log file, the fields are space delimited, but I used tabs here to break the fields up better. As well, there is one entry per page printed. Both of the last two bits of information will be important to us as we process this file in the script.

Script Properties

```
property thePrinterNameList : {} --a list of printer names, unsorted, one per
line in the thePageLogContentsList
property thePrinterTypeList : {} --a list of unique printer names, 1 line per
printer name, derived from the getThingTypes handler
property wasThereAMatch : 0 --used in the getThingTypes handler as a match flag
property theUserNameList : {} --a list of user names, unsorted, one per line in
the thePageLogContentsList
property theListedUsers : {} --a list of unique user names, 1 line per user
name, derived from the getThingTypes handler
property totalPagesForMachine : 0 --holds the total pages printed by the
machine
property pagesByUserList : {} --a list with one entry per user page total. THIS ONLY HAS
THE NUMBER,
--YOU HAVE TO MATCH IT WITH theListedUsers TO GET PAGES/USER!
property pagesByPrinterList : {} --a list with one entry per printer page total. THIS
ONLY HAS THE NUMBER,
--YOU HAVE TO MATCH IT WITH thePrinterTypeList TO GET PAGES/printer!
property theTotalCountedThings : 0 --used as a counter in the getTheList
handler
property theTotalCountedThingsList : {} --generic handler processed list
variable for passing lists back and forth
property theListedThing : {} --generic list variable for passing data to
handlers
property theCurrentThing : "" --generic text variable for various handlers,
used mostly for matching ops
property theCurrentThingPages : "" --used as a variable in
getDataByPrinterOrUser for holding page counts by user or printer
property theCurrentLine : "" --when processing thePageLogContentsList,
holds one line of that list as a string
property theCurrentLineContentsList : {} --when processing
thePageLogContentsList, holds one line of that list as a list
property usernameOrPrinterName : 0 --handler variable, tells if you are dealing with a
printer name or a user name, is a
--list placeholder, 2 = user, 1 = printer
property userOrPrinter : "" --text flag used in getDataByPrinterOrUser for
determining user or printer in report line
property theLastThing : {} --generic handler unprocessed list variable for
passing lists back and forth
property theListedThingType : "" --used as an inner repeat loop matching
variable holder in the getThingTypes handler
property theListedThingPages : {} --generic handler list variable for
processing pagesByPrinterList and the pagesByUserList
property thePrinterReportFilePath : "" --alias to where the tab
delimited file will be, set by user
property thePageLogAlias : "" --alias to the cups page log file
property thePageLogPath : "" --POSIX path to the cups page log file
property thePageLogFile : 0 --file handle when reading the cups page log file
property thePageLogContents : "" --holds the contents of the cups page log
file
property thePageLogContentsList : {} --holds the list version of
thePageLogContents
property theWrite : "" --placeholder used to generate the report file
```

The comments following each -- are the ones I used while developing the script. I have learned over the years that a certain reflexive obsession with regard to commenting comes in handy when revisiting code for things like updates, or writing articles on it. Because AppleScript's native text handling capabilities are anemic at best, we use a lot of lists to compensate. While there

are a number of AppleScript extensions, or OSAX that make up for this, I try to avoid them where possible, so my scripts will run on the largest number of machines possible without requiring the user to download and install extensions. If the property names and comments don't make sense at the moment, don't worry. As we go through the rest of the code, you'll see what they're all used for.

The Main Script Body

The first thing we see is a call to System Events, a part of Mac OS X used for certain system functions that were handled by the Finder in Mac OS X. While we could use the Finder for this, System Events is the more correct way to handle our needs here. In this case, we ask System events for the name of every disk labeled a startup disk, and get the name of the first one. Since there should only be one of these, assuming the first one is the one we want poses little risk of error. Since a list is returned, we have to grab the first item from the list, even if it is the only item:

```
tell application "System Events" --get the name of the startup disk code
    set theStartupDiskList to (the name of every disk whose
startup is true) --gets a list of all startup disks
    set theStartupDiskName to item 1 of theStartupDiskList --on
any running Mac, there is only one startup disk, so it's always item 1
end tell
```

The next set of lines get an alias to the page_log file, and the POSIX, or Unix - style path version of that alias. The first line also concatenates the name of the startup disk that we got earlier so that we have a full alias to the page_log file. The conversion to the POSIX path handles renaming the disk name in the alias to a more proper "/":

```
set thePageLogAlias to (theStartupDiskName &
":private:var:log:cups:page_log") as alias --get the path to the page
log file. Hardcoded unless it needs to move about
set thePageLogPath to POSIX path of thePageLogAlias --posix path
of thePageLogAlias, just in case
```

The next lines open the page_log file without write permission. It would be hard to open it with write permission unless root was running the script, and this way, we avoid accidents. We then dump the contents of the file to the variable "thePageLogContents". We then close the file access handler so that we don't have open file handlers laying about:

```
set thePageLogFile to open for access thePageLogAlias without
write permission --open the page log file read-only, it's all we need, and it's safer
set thePageLogContents to read thePageLogFile --dump the contents
of the file into a variable
close access thePageLogFile --close the file handler, leaving those open is bad
```

Now, so that we can more easily use the contents we've just read, we turn it into a list, with each line in the log being one item in the list. To do this, we use the end of line characters as text item delimiters, by telling AppleScript to use the "\n" character as its new text item delimiter, saving the original value to the variable "oldDelims" so we can restore it later. Then we make a list from every text item in thePageLogContents, one

item per line. Once that's done, we clean up after ourselves by resetting AppleScript's text item delimiters to their original value:

```
set oldDelims to AppleScript's text item delimiters -temp store
Applescript current delimiters
set AppleScript's text item delimiters to " " -use \n as the current
delimiter, since it's a Unix text file
set thePageLogContentsList to (every text item of
thePageLogContents) --turn the page log into a list
set AppleScript's text item delimiters to oldDelims -reset the
delimiters
```

We then take advantage of CUPS creating one line per page printed, and use the length of the list to get us that information, and store it in `totalPagesForMachine`. Since the last line of the log is blank, we subtract one from the length to get the correct number of pages:

```
set totalPagesForMachine to ((length of
thePageLogContentsList) - 1) -the last line is always blank
```

The next bit of code takes advantage of the consistency of the `page_log` format. Since it always has the same number of fields and each field always has the same contents, we can make some assumptions that let us get the printer name and user name. In this case, the first field is always the name of the printer, and the second field is always the user name. So, what we do is make two lists, one of user names and one of printer names by manipulating the AppleScript text item delimiters for each entry in the `PageLogContentsList`, which is, as we should still recall, one line from the original `page_log` file. By using the space character for the delimiter, we temporarily turn each entry in the `PageLogContentsList` to a list of its own, then grab item one and shove it into a list of printer names, then shove item two into a list of user names. Yes, we'll have duplicates, but we'll handle those in a bit. Once we've done this for the entire `PageLogContentsList`, we're pretty much done with the main body of code for the script for the moment, as the next few sections are mostly calls to handlers:

```
repeat with x from 1 to (length of thePageLogContentsList) -
this is to get us two lists...user names and printers
  set theCurrentLine to item x of thePageLogContentsList -grab
a line out of the list
  set oldDelims to AppleScript's text item delimiters -temp
store Applescript current delimiters
  set AppleScript's text item delimiters to " " -use space as the
current delimiter
  set theCurrentLineContentsList to (every text item of
theCurrentLine) -turn the page log line into a list
  if item 1 of theCurrentLineContentsList is not "" then -
check for that blank line
    set the end of thePrinterNameList to item 1 of
theCurrentLineContentsList -item 1 is always the printer
    set the end of theUserNameList to item 2 of
theCurrentLineContentsList -item 2 is always the username
  end if
  set AppleScript's text item delimiters to oldDelims -reset the
delimiters
end repeat
```

So, now we have a list of users and a list of printers, but at the moment, they aren't that useful. Since each job has one entry per page, we are going to have a lot of repeats, so we need to make sure we only have one of each user or printer. First, let's

take care of the printers. While we could use unique handlers for each of these, we don't have to. The code to handle the printers and the names is almost identical, so with a little work, we can use one handler to process both. One thing I did here, which you may or may not agree with procedurally, is to use generic names for the handlers. If nothing else, it makes it harder for me to forget that I'm out of the main body of code, and in a handler.

Calling our handler, and getting a return back takes three lines. The first sets our handler variable to the contents of the `PrinterNameList`. The second sets the variable `thePrinterTypeList` to the results of `getThingTypes(theListedThing)`. Once the handler is finished, then we clear the `TotalCountedThingsList`, (used in the handler):

```
set theListedThing to thePrinterNameList -I prefer using generic vars
for multipurpose handlers, it's easier for me
set thePrinterTypeList to getThingTypes(theListedThing) of me
-get a list of unique printers
set theTotalCountedThingsList to {} -clear this list
```

The `getThingTypes(theListedThing)` Handler

Now, let's take a look at the `getThingTypes(theListedThing)` handler. The handler uses a repeat loop to iterate through the list, `theListedThing`. We check to see if `theLastThing` is blank, which indicates that this is the first time through the list. If it is, we set `theLastThing` to the first item in `theListedThing`. This is important, since this handler's purpose is to create a list of unique user or printer names. We also set the current item of `theListedThing` to the end of the `TotalCountedThingsList`, since this is the first time through the list:

```
repeat with y from 1 to (length of theListedThing) -run the list
of names
  if theLastThing is "" then -if this is the first iteration
    set theLastThing to item y of theListedThing -set
theLastThing as a comparator
  set the end of theTotalCountedThingsList to item y of
theListedThing - first name in the list is the first name on the new list
end if
```

Next, we set `theCurrentThing` to the current item of `theListedThing`. This is going to be the prime variable used to check for duplicates:

```
set theCurrentThing to item y of theListedThing -test against the
current item
```

We now compare `theCurrentThing` to `theLastThing`. If they aren't equal, good. But since we have to check for more than one duplicate, we can't stop there. This is where the `TotalCountedThingsList` comes into play. We run another repeat loop through that list, assigning the `ListedThing` type to the current item of the list as we run through this loop, and compare it to `theCurrentThing`. If there is a match, we set `wasThereAMatch` to 1, and exit the loop. If we make it through the `TotalCountedThingsList` without a match, we set `wasThereAMatch` to 0. Once we are out of the loop, if `wasThereAMatch` is 0, then there was no match, and

theCurrentThing is a unique name, so we tack it onto the end of theTotalCountedThingsList. We then set wasThereAMatch to 0, to clear the loop. This is done for every entry in theListed thing. Once we have checked every entry in that list, we clear wasThereAMatch and theLastThing. We pass theTotalCountedThingsList, which is now a list of unique printers or usernames back to the calling code line, and that's the end of the handler.

```
if theCurrentThing ≠ theLastThing then -no, not the same thing
    repeat with z from 1 to (length of the
theTotalCountedThingsList) -run the list of printer types we already have
        set theListedThingType to item z of
theTotalCountedThingsList -grab a name to test against

        if theCurrentThing = theListedThingType then -is this
printer already in here?
            set wasThereAMatch to 1 -yes
            end if

        end repeat

        if wasThereAMatch = 0 then -new printer type
            set the end of theTotalCountedThingsList to
theCurrentThing -stick this in the list of printer types
            end if

        set wasThereAMatch to 0 -clear the var in the loop
        end if

    end repeat
    set wasThereAMatch to 0 -clear the var
    set theLastThing to "" -clear the var
    return theTotalCountedThingsList -here's a list of unique names
```

Our next three lines back in the main body of code call getThingTypes(theListedThing) to get a list of unique user names in theListedUsers, and works the same as what we just saw for getting printer names. We, therefore, have the same handler used to get two different lists of data, without duplicating the code. Code reuse is real, and it rocks.

So, we now have a list of users and a list of printers, and the total pages printed. Not bad, but we need to know how many pages each user printed, and how many pages each printer printed. Again, we're going to use the same handler to get this information, but we also need to track what we're trying to get, printer or user info, so we use the variable usernameOrPrinterName to do this. Remember that in the page_log file, the printer name is always the first field for each entry and the user name is always the second field. If we are looking for user data, we set usernameOrPrinterName to 2, and if we want printer data, we set usernameOrPrinterName to 1.

We again use theListedThing as the list variable we pass, and since we are looking for user data, we set it to the contents of theListedUsers. We set usernameOrPrinterName to 2, indicating we want user data, and then pass both of them, along with thePageLogContentsList to getTheList, and return the results to pagesByUserList. Once we are done with the handler, we again clear theTotalCountedThingsList:

```
set theListedThing to theListedUsers
set usernameOrPrinterName to 2 -we're going to get user pages
set pagesByUserList to getTheList(theListedThing,
thePageLogContentsList, usernameOrPrinterName) of me
```

```
set theTotalCountedThingsList to {}
```

The getTheList(theListedThing,thePageLogContentsList,usernameOrPrinterName) Handler

Now, lets look at the getTheList(theListedThing,thePageLogContentsList,usernameOrPrinterName) handler. We use a repeat loop to iterate through theListedThing, which, in this case is the list of unique user names. We set theCurrentThing to the current item in that list. We then set another repeat loop for thePageLogContentsList. We set theCurrentLine to the current item of that list. Next, we call on our old friend, AppleScript's text item delimiters to turn theCurrentLine's contents into a list, theCurrentLineContentsList. Since CUPS loves to insert blanks, we make sure that item 1 isn't blank. Now, the next part is a little tricky to follow. We have set theCurrentThing to the current item of theListedThing, which is for now, a list of user names. We had also set usernameOrPrinterName to 2, indicating we are looking at pages per user. So, we need to only count the pages for a particular user. So, we check to see if item usernameOrPrinterName, or 2, of theCurrentLineContentsList matches theCurrentThing. If it does, then we want to count this line as a page printed by that user, (page_log uses one line per page printed), and increment our page count, theTotalCountedThings. Once we have gone through thePageLogContentsList, we reset AppleScript's text item delimiters to their default. Next we set the end of theTotalCountedThingsList to theTotalCountedThings, and set theTotalCountedThings back to zero, so we can get the page count for the next user name in theListedThing list. Once we have completely run through that list, we then return theTotalCountedThingsList to the calling line, and exit the handler:

```
on getTheList(theListedThing, thePageLogContentsList,
usernameOrPrinterName)
    repeat with x from 1 to (length of theListedThing) -let's get
the total pages by user first
        set theCurrentThing to item x of theListedThing -set the
current user we are looking at

        repeat with y from 1 to (length of
thePageLogContentsList) -now we want to get total user pages by user
            set theCurrentLine to item y of thePageLogContentsList
            -grab a line
            set oldDelims to AppleScript's text item delimiters -
temp store AppleScript current delimiters
            set AppleScript's text item delimiters to " " -use space
as the current delimiter
            set theCurrentLineContentsList to (every text item of
theCurrentLine) -make the line a list
            if item 1 of theCurrentLineContentsList is not "" then
                -there's always a blank line to blow things up
                if item usernameOrPrinterName of
theCurrentLineContentsList = theCurrentThing then -if the user
we're looking at printed this
                    set theTotalCountedThings to theTotalCountedThings
+ 1 -increment the page count for the user
                end if
            end if
            set AppleScript's text item delimiters to oldDelims -
reset the delimiters
            end repeat

        set the end of theTotalCountedThingsList to
theTotalCountedThings -build the list
        set theTotalCountedThings to 0 -clear the var
```




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```

end repeat
return theTotalCountedThingsList
end getTheList

```

Back in the main body of the code, we call this handler again, only to get the printer pages. The code works exactly the same, as in fact, it's the same handler. The only difference is which field in the `page_log` file we're dealing with.

Now that we've collected a bunch of data, we need to create the output file for it. First, we ask the person running the script where they want to save the file, and what they want to call it. This is done with `choose file name`, which gives us an alias to a file that doesn't exist yet.

```

set thePrinterReportFilePath to choose file name with prompt
"Pick the location for the printer report file" default
name "Printer Report File.txt" -user interaction, pick where you want
the output file to go, and give it a name

```

Then we set the variable `theWrite` to a nice long text string with the data we already have, such as total number of printers, total number of users, and total pages printed from this machine. Each line is tab-delimited with the `"\t"` character, which doesn't show up on screen once the script is saved, and each line is created with the `"\r"` character, which is invisible once the script is saved, and interpreted as a return:

```

set theWrite to ("Total number of Printers " & (length of
thePrinterTypeList) & "
Total number of Users " & (length of theListedUsers) & "
Total number of pages for all printers " &
totalPagesForMachine) as text -get the non-user, non-specific things, dump
it into a text string var

```

But we still want a few more things, like pages per printer, etc. in the report. So, we set `theListedThing` to `thePrinterTypeList`, and `theListedThingPages` to `pagesByPrinterList`. We use the `usernameOrPrinterName` variable again, setting it to 0, to show the next handler that we are getting pages per printer. We then set `theReport` to the result of the handler `getDataByPrinterOrUser(theListedThing, theListedThingPages, theWrite, usernameOrPrinterName)`:

```

set theListedThing to thePrinterTypeList
set theListedThingPages to pagesByPrinterList
set usernameOrPrinterName to 0 -we're going to get how many pages each
printer printed, and dump it into a text string
set theReport to getDataByPrinterOrUser(theListedThing,
theListedThingPages, theWrite, usernameOrPrinterName) of me -
get pages by printer, and glom it on the end of theReport

```

The `getDataByPrinterOrUser(theListedThing, theListedThingPages, theWrite, usernameOrPrinterName)` Handler

The handler we use here is fairly simple. First, we check to see if we are doing printers or reports:

```

if usernameOrPrinterName = 0 then -which one are we looking at
set userOrPrinter to "Printer"
else
set userOrPrinter to "User"
end if

```

Next, we run a repeat loop to iterate through `theListedThing`. We set `theCurrentThing` to the current user or printer name in `theListedThing`. We then set `theCurrentThingPages` to the same item in a different list, `theListedThingPages`. (The only reason this works is that thanks to the way CUPS sets up its `page_log` file, and the way we have gotten the data from that file, the lists synchronize nicely. I know this is a rather fragile way of doing things, but for now it works, and saved me a lot of work when I wrote this script. Obviously, anytime CUPS or Mac OS X get updated, the script should be tested to see when this finally breaks.) Then we concatenate a new line onto the end of `theWrite`, which gives us a tab-delimited line that shows "Printer" <tab> `theCurrentThing` <tab> "total pages" <tab> `theCurrentThingPages`. By placing the return character in front of the word "Printer" we ensure that each time we run through this list, we are creating a new line. Once we've run through `theListedThing`, the repeat loop exits. We clear out `theListedThing` and `theListedThingPages`, return `theWrite`, and that's the end of the handler:

```

repeat with x from 1 to (length of theListedThing) -run through
the list of printers or users
set theCurrentThing to item x of theListedThing -grab the
first printer or username
set theCurrentThingPages to item x of
theListedThingPages -grab the first page count by user or printer
(This is to work around some annoyances with records that make it easier to
use two lists. As it turns out, positionally, everything lines up. I imagine this will bite
me one day)
set theWrite to theWrite & "
" & userOrPrinter & " " & theCurrentThing & " total pages " & theCurrentThingPages -
append pages for a printer or a user in
-tab - delimited format
end repeat
set theListedThing to {} -clear the var
set theListedThingPages to {} -clear the var
return theWrite -return the new text data
end getDataByPrinterOrUser

```

Now, we reuse the handler to get pages per user into our report in the correct format:

```

set theListedThing to theListedUsers
set theListedThingPages to pagesByUserList
set theWrite to theReport -theWrite doesn't update completely when you
jack it between handlers, so this fixes that
set usernameOrPrinterName to 1 -we're going to get how many pages each
user printed, and dump it into a text string
set theReport to getDataByPrinterOrUser(theListedThing,
theListedThingPages, theWrite, usernameOrPrinterName) of me -
get pages by user, and glom it on the end of theReport

```

Okay, we've got our report. Let's write it out to a text file! First, we set `thePrinterReportFile` to the file handle returned by the `open for access` function. Since we are writing to the file, we obviously want to open the file, (using `thePrinterReportFilePath` we got from the user earlier) with write access. We then write the data in `theReport` to `thePrinterReportFile`, and then close the file handle. Almost done!

We could just end the script there, but face it, what do you do with a tab-delimited text file? Well, you mostly use it in other applications, such as FileMaker Pro, or Microsoft Excel. So let's save the user some time, and deal with this now.

First we set up a nice dialog box that tells the user the report has been created and where. We also allow them the option of inserting this report into FileMaker Pro or Microsoft Excel. We also, of course, allow them to do nothing, end the script and get on with other things. We set theProcessingRecord to the record returned from display dialog:

```
set theProcessingRecord to display dialog "The Printer Report
has been created at:
" & (thePrinterReportFilePath as text) & "
Please click the button that corresponds to the application
you would like this file opened in" buttons ("Microsoft
Excel", "Filemaker Pro", "None") default button "None" with
icon note -nice option if you want to process this file right away
```

Inserting into Microsoft Excel or FileMaker Pro

When you are dealing with scripting any of the Microsoft Office applications, other than Entourage, you have to deal with a rather odd dictionary setup, primarily because things like Excel can be scripted in either AppleScript or Visual Basic for Applications (VBA). To make things easier, Microsoft had to make some unique decisions in the dictionaries for Excel and Word, so they do look a little odd. Excel's dictionary is quite useful, you just have to wrap your head around it.

The biggest oddity that affects the script is that Excel really can't handle aliases, so we have to convert the alias to a text string, then tell Excel to open it:

```
if button returned of theProcessingRecord = "Microsoft Excel"
then -dump it into Excel
```

```
try
  tell application "Microsoft Excel"
    open (thePrinterReportFilePath as text) -Open can't handle
aliases, so we have to use a text version
  end tell
end try
FileMaker Pro is a bit simpler, since it can handle aliases:
else if button returned of theProcessingRecord = "Filemaker
Pro" then -dump the file into FMPro
try
  tell application "FileMaker Pro"
    open thePrinterReportFilePath
  end tell
end try
end if
```

If they don't pick either Excel or FileMaker Pro, then we leave the file alone, and the script is done.

CONCLUSION

Well, that's a lot of list work, but you get a neat, and possibly useful result. Printers can be a huge expense if their use isn't monitored closely. Thanks to CUPS, Mac OS X and AppleScript give you a way to do this. Now, there are still some things we could do with the script, such as trying to get pages per printer per user, etc., but this is a good start. As well, some judicious shell commands could make this script much shorter, and probably faster. It's not that long now, though, and my tests didn't show that it took all that long to run on an 800MHz PowerBook G4, so it's probably okay as it is. If nothing else, consider this an example of how AppleScript is still quite useful to the network administrator in Mac OS X.

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By Rich Morin

File System Security

How (not) to make OS X as secure as MS Windows...

Mac OS X inherits most of its notions of file system security from BSD. Each file system node (file, directory, ...) has sets of permission (i.e., mode) bits for its owner, its group, and everyone else. The node's owner is restricted by the first set of mode bits. Other members of the node's group are restricted by the next set. Everyone else is restricted by the final set.

Let's look at some of the top-level permissions on a Mac OS X (10.2.8) system, to see how this plays out in practice:

```
% ls -dl /bin /sbin
drwxr-xr-x  35 root  wheel ... /bin
drwxr-xr-x  60 root  wheel ... /sbin
```

The first set of mode bits (**rw**x) allows these directories' owner (**root**) full access permissions. S/he can read (e.g., look up entries), write (e.g., add or remove entries), and execute (e.g., access entries) in the directory.

The following sets (**r-x**, **r-x**) restrict other users from writing, but allow read and execute access. Note, by the way, that this does not prevent someone from writing into an existing file in one of these directories, if the permissions of the file allow this.

In summary, nobody but **root** is able to write (e.g., create files) in any of these directories. So, "normal" users (and the programs they may accidentally or unsuspectingly) aren't able to add, remove, or rename programs.

This is very much what we'd expect in a well-designed, BSD-based system. Allowing user errors, programming mistakes, or malware to modify the system's executable code is (as myriad Microsoft-specific viruses demonstrate) a serious design error.

Unfortunately, Apple doesn't follow BSD's example everywhere; some Mac OS X system directories are all too vulnerable to the aforementioned threats:

```
% ls -dl /App*s /Developer /Library
drwxrwxr-x 59 root admin ... /Applications
drwxrwxr-x 14 root admin ... /Developer
drwxrwxr-x 40 root admin ... /Library
```

In an effort to support "ease of use", Apple's engineers have made some critical directories far more open than they would be on a conventional Unix system. As a result, most users (and any programs they may run) can add, delete, or replace any node in these directories.

In a fine example of the "Law of Unintended Consequences", several plausible decisions work together to produce this undesirable result. Here's how it goes:

- The first account created on a new system has "admin" privileges, by default, and few users bother to set up a separate administrative account. So, most users have admin privileges.
- Any user who has admin privileges is put into the **admin** group.
- The **admin** group has write permission for all three of these directories, so any member of the group can add, delete, or replace any node in these directories.
- Any program run by a user has, by default, the same permissions as the user.

Here's a simple (and safe :-)) experiment you can try. Note that the system prevents you from modifying **/bin**, but allows you to modify **/Applications**:

```
% groups
admin
% touch /Applications /bin
touch: /bin: Permission denied
```

In most cases, the system asks the user for authorization before taking any unusual or suspect action. Consider the password that **sudo(8)** requires and the authorization dialogs that come up on occasion (e.g., when installing software).

In this case, however, no warning is given. Any user with admin privileges is quite free to drag folders in and out of **/Applications**; no authorization dialog will come up. Apple is quite aware of this situation; in fact, their documentation suggests a possible workaround:

Only admins can install software in the Applications folder. You may find that you want to set up a user account that doesn't have admin privileges and use that for day-to-day tasks. That way you won't absent-mindedly delete an application by accident.

Rich Morin has been using computers since 1970, Unix since 1983, and Mac-based Unix since 1986 (when he helped Apple create A/UX 1.0). When he isn't writing this column, Rich runs Prime Time Freeware (www.ptf.com), a publisher of books and CD-ROMs for the Free and Open Source software community. Feel free to write to Rich at rdm@ptf.com.

– <http://www.apple.com/macosx/learning>

I strongly suspect, however, that most machine owners will never see this advice. Even if they do, they may decide to ignore it. Logging in and out of accounts is a time-consuming hassle. Panther's "fast user switching" will improve this situation, but it will still break the user's concentration.

So, most users will run as admin, expecting the Finder (and other apps) to ask them before doing anything odd. Unfortunately, the Finder won't even be called into play if a rogue application is bent on rewriting parts of the file system (e.g., installing virus code).

In summary, Apple has opened up a major security hole that is not present in Mac OS X's forebears (Unix, FreeBSD, ...). Expecting application programmers (or worse, users!) to compensate for insecure directory permissions is simply bad design. The underlying system needs to be secure; exceptions can then be made on a carefully-controlled basis.

In this case, this means that the permissions need to be fixed. Administrative actions can then be performed using "privilege elevation", under the control of authorization dialogs, etc. Administrative users are quite used to being asked for this sort of authorization, so ease of use isn't being compromised.

Note: Because the root directory allows write permission to members of the **admin** group, you might think that it opens up a similar security hole. However, its permissions (**drwxrwxr-t**) include the use of the "sticky" bit (as indicated by a "t" in the last position). This allows admin users add items to the root directory, but prevents them from removing or renaming anything that they don't own. See **sticky(8)** for more details.

THIRD-PARTY APPS

Third-party developers have some excuse for being unfamiliar with permissions issues (classic Mac OS wasn't real big on security :-), but by now, they should have learned the basics. So, it's disturbing to find many vendors leaving their application packages wide-open to writing by any user (or program) on the system.. Try:

```
% cd /Applications
% ls -ld * | grep rwxrwxrwx
drwxrwxrwx ... Alarm Clock S.E..app
drwxrwxrwx ... AutoSync.app
drwxrwxrwx ... Classic Toggler folder
drwxrwxrwx ... Cocoa Browser.app
drwxrwxrwx ... GraphicConverter US
drwxrwxrwx ... Multiple Launcher X.app
drwxrwxrwx ... OmniDictionary.app
drwxrwxrwx ... OmniGraffle.app
drwxrwxrwx ... PTHPasteboard
drwxrwxrwx ... RBrowser.app
drwxrwxrwx ... ShuX.app
drwxrwxrwx ... SliMP3 Server.app
drwxrwxrwx ... Text Welder
drwxrwxrwx ... Tri-BACKUP Folder
drwxrwxrwx ... VLC.app
-rwxrwxrwx ... iCab
```

Let's say that Susie downloads a nifty-looking program and runs it (e.g., from her Downloads directory). Gee, it didn't do anything. That's no fun; let's try something else... Meanwhile, the

"nifty-looking program" has infected any vulnerable third-party apps. When Susie's mom runs one of these (using an admin account), the infection can spread to the rest of the system.

CAN ANYTHING BE DONE?

Some folks at Apple are very concerned by these (and other) security holes, but they (clearly) aren't in control of Apple's overall security policy. As a result, OSX is ripe for the kind of bad publicity that MS Windows has recently received.

As a developer, you have a responsibility to set appropriate permissions on your package directories. Do that, and *your* app won't be part of the problem. Then, file bug reports with Apple, asking them to tighten up their own security holes and give developers automated feedback and assistance in closing holes in third-party applications.

Several possibilities spring to mind. If Interface Builder can draw helpful blue lines to indicate that a widget is too near the edge of a window, why can't Xcode (or whatever tool is used for package creation) tell the developer when a package's permissions are "too near the edge"?

For that matter, why can't the installation software check for this sort of thing? And, while Disk Utility is looking for weird permissions and ownerships, why can't it look for wide-open package directories? Like that...

More generally, when you talk to Apple, tell them that you don't want security concerns to be completely overridden by "ease of use" considerations. Both are critical; a proper solution won't ignore either one.

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Remote

Dave becomes the couch potato we all wish we could be

The November issue of MacTech is always one of my favorites. It's our annual *Gift Guide* issue and there's always something unusual, something cool, something I can circle in red crayon and leave around the house for my faithful family to find and buy for me!

To start things off this year, we've got a humdinger of a gift. A bit pricey, but oh will you want one.

Buzz on over to <http://www.harmonyremote.com> and check out the ultimate in remote controls, the SST-76. The list price is \$299, but <http://www.devdepot.com> has it for less than that. I'm a gadget junkie and, without a doubt, this is the best universal remote I've ever seen. In my opinion, head and shoulders better than its closest competition.

What makes this remote so great? In a nutshell, it's so easy to use. I've got a reasonably complex setup, with a VCR, DVD player, video receiver, large screen TV, and satellite controller. Each of those components has an associated remote control. With a fair amount of work, I've been able to program 2 of my remotes to control most of what I do with my system. And even with all that work, there are still situations where I find myself digging out the original remote (such as, changing the screen format on my TV from 4:3 to 16:9, or changing the options on my satellite dish).

And when it comes time to change the programming on my universal remote, I find myself having to relearn the "learning" mechanism. Lord help me if I ever have to swap out one of my components.

The SST-768, from *Intrigue Technologies*, changed all that. When you open the box, you get a remote, a USB cable, and an installation CD, compatible with Mac OS X and Windows. I ran the installer, then ran the newly installed *Harmony Remote* app. I opened the preferences and set the download folder to match my Safari download folder (this turned out to be *very* important) and checked the *Watch download folder* and *Cleanup downloaded files* checkboxes.



Figure 1. The SST-768 in red, silver, and blue.

Next, I went onto <http://www.harmonyremote.com> and clicked the *New User Login* link. I filled out a short form, then logged in. Next, I went through a sequence of easy steps to specify all my components. The web site knew every single one of my components, even though some of them are pretty old.

Then came the important part. Now that it knew my components, the site asked me to pick from a list of activities I wanted programmed into my remote. I picked, Watch a DVD, Watch Television, Watch the VCR, and Listen to the Radio. I also went through the channel listings for my satellite setup and selected the channels I wanted on my remote. Once that was done, I plugged the USB cable into the remote and clicked the link that said Update My Remote.

When I unplugged the remote, I used the scroll wheel to select my activity. For example, **Figure 2** shows the remote scrolled to Watch a DVD. The scroll wheel is also a button. Once you scroll to the activity you want, press the button and voila! The remote switches all the components to the correct settings.

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Figure 2. Close up shot of the silver SST-768

There is a *lot* more to this remote. The web site is an incredible resource. On it, you can customize your settings, even edit the XML assigned to each button. You can create a list of favorite stations that you can scroll through using the scroll wheel. There's a zap button that you can press whenever something of

interest is on the screen. The remote remembers what you were watching when you zapped and saves that info for you the next time you connect the remote to your computer. For now, your zap list is strictly made up of the shows you were watching when you zapped, but eventually, the capability to search the net for products whose commercials you zapped could be added.

You can download program listings onto your remote in case you don't have an on-screen guide. And all this is saved to non-volatile flash memory, so even if you lose your batteries, you won't lose your settings.

If there is a down-side to this remote, it is the problem common to all macro-driven remotes. It is fairly simple to get out-of-sync with your components. Usually, this is caused when you press a button on the remote, then turn away or put the remote down before the macro has finished each of its steps. After a while, you learn to keep the remote pointed at your components until the macro completes all of the steps. If you do get out of sync, you can use the *mode* button on the side of the remote to address individual components. Amazingly, you can use this feature to issue just about every imaginable command the original remote was capable of. All-in-all, an amazing leap forward for all couch potatoes!

Intrigue Technologies is in Mississauga, Ontario. You can reach them at 866-291-1505 or at www.harmonyremotes.com.

Harmony Remotes are available at DevDepot!
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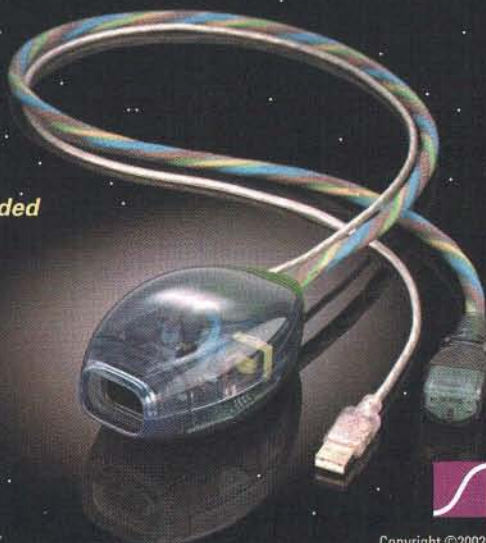
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By William Porter

Point

Apple Wireless Mouse

My daughters already have iBooks and personalized iPods, so what's left for me to give them for Christmas? Apple Bluetooth Wireless Mouses, that's what. Sure, the image of a Bluetooth mouse sounds a bit more like October 31 than December 25, but once my girls get down from the top of the bookshelf, they'll realize that this mouse is actually rather cute, and very practical.

The Wireless Mouse is a snap to set up and configure. From the time I plugged a D-Link Bluetooth adapter into a USB port in the back of my PowerBook—the adapter is a necessary companion device—it took only thirty seconds to get the mouse working. I opened the little users guide that comes with the mouse, but only read page 1 before deciding to do it the Macintosh Way: by blind guesswork. You must have OS X version 10.2.6 or better to use the wireless mouse. If you qualify (and who reading MacTech doesn't have the absolutely latest version of the Mac OS?), then it's just a matter of putting the two AA batteries into the mouse, turning it on, opening the Keyboard & Mouse panel in System preferences and clicking on the button to configure a new Bluetooth device. The OS does the rest: finds the mouse, gives it a name (it named mine "williamporter's mouse"), and kick starts the little dear. I'd say "Plug and play," but aside from the Bluetooth adapter, there's nothing to plug!

I tried a third-party cordless mouse about a year ago. I gave it up because it did not seem to me to be as sensitive as a traditional mouse. Besides, while the mouse itself was cordless, there was a transmitter attached to the computer by a USB cable. So it didn't reduce the clutter on my desk, just the clutter around the mousepad. The Apple Wireless Mouse, however, really is wireless: It exchanges signals with the tiny Bluetooth adapter plugged into the back of my PowerBook. And it seems every bit as sensitive as my Apple Pro USB mouse. In fact, in my hand, it feels almost identical, which isn't surprising because it's the same size and shape. I say "almost identical," because the absence of the USB cable does make a slight and entirely agreeable difference to the feel of the thing as I use it.

The Wireless Mouse comes in one color: snow white. It will look great with my daughters' iBooks. Not so great with my Titanium Powerbook, but I can live with it. At least it's not tangerine or chartreuse.



When I first got mine, jealous friends said to me, "What about battery life?" Not a problem. In a week of almost constant use, during which time I routinely forgot to turn the mouse off when I walked away from my computer, the battery life indicator in the Keyboard & Mouse panel budged off 100% just once, and in retrospect, that seems to have been a fluke. The mouse automatically drops to low-power when it's idle for a while. Your mileage may vary. I may switch to rechargeable batteries at some point, but not any time soon.

Revolution-wise, we're not talking wireless Internet here. But the elimination of any wire or cable is a blessing. And the Wireless Mouse is undeniably cool. Hey, don't just give it as a gift to others. Buy one for yourself, too. You know you want one.

Technical specs:

- The Wireless Mouse requires OS X v10.2.6 or higher. It also requires a Bluetooth-enabled Macintosh, either built-in or using the qualified D-Link DBT-120 USB Bluetooth Adapter (older D-Link DWB-120M adapters are not supported).
- Apple Wireless Mouse: \$69 from the Apple Store.
- D-Link DBT-120 USB Bluetooth Adapter: \$49.95 from the Apple. This is just one of several Bluetooth options available.



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By Michael R. Harvey

Hear

Audio goodies to please the ear

For the audiophile in your life, nothing is better than a holiday gift that appeals to their jones. If you are on a budget, however, the big super duper extra groovy surround system that teleports a real live symphony orchestra into your living room just isn't going to make the shopping list. Never fear, however, as there are options that are almost as good as teleportation, and slightly more affordable.

JBL CREATURE

It's straight out of B Sci-Fi flick, only not bad. Creature. This three piece, self powered, speaker set from Harmon Multimedia defines cool looking. All three pieces have the same bell curve/UFO look about them. You get the feeling that if the satellites weren't tethered to the Earth with wire, they'd fly right off your desk and back to the home world. Each of the satellites has a small LED underneath that lights up, adding to its other worldly appearance.

Beyond its looks, it is actually a nice sounding set of speakers. The Odyssey+ drivers in the satellites push a total 8 watts, while the Magnum driver in the subwoofer pushes 24. All three parts are shielded so they can be close to a monitor or other magnetically sensitive hardware. However, the bass the subwoofer pushes enough bass to rattle the image on a monitor, so don't put it too close.

Set up is pretty typical for any set of speakers. The power button, however, is on the back of the subwoofer, a necessary evil to keep the looks of the satellites intact, but highly annoying none the less, especially if you have the subwoofer on the floor. Likewise, the bass and treble are controlled from the subwoofer. The two spikes sticking up at the front corners are the knobs for that. At least you have the volume control on the right satellite. The controls for volume are quite nice, actually. They are pressure sensitive touch pads. Tapping once on either the plus or minus button will get you a 2.0 decibel increase or decrease. Holding down either for more than half a second will give you a continuous rise or decline in 5 decibels increments. Pressing both at the same time will mute your speakers.

The Creatures are a nice set of small speakers that will fit nicely into a small, cramped dorm room, the kids room, or anywhere you want to have some speakers ready to plug your



iPod into. They have a suggested retail of \$129, and come in three colors, white, black, or blue.

ALTEC LANSING VS4121

Now these are some interesting speakers. They are not nearly as cool looking as the Creatures, but they have a look all their own, and what they lack in outlandish styling, they make up for in pure sound. This set is also a 2.1, self powered unit, with subwoofer and two satellites. The satellites are comprised of tweeters in a sound stick type design, with downward firing midrange drivers incorporated into the base of the satellites. The subwoofer is little more than a wooden box, but the impressive 6.5 inch subwoofer capable of producing a maximum 19 watts of power takes that wooden box and pumps out some good, deep, rattle your fillings bass sound. One note, however. While the satellites are shielded, and can be placed next to the monitor, the subwoofer is not, and should be given some distance from magnetically sensitive devices. All the controls are easily accessible on the right satellite. Volume, power, bass and treble controls are plainly marked and clearly show what their settings are. It also has a headphone jack next to the controls, a very nice addition for those times when you have to be quiet. These speakers sound really, really good. Full sound that does justice to any kind of music you would care to pump through them. Altec Lansing lists them for \$129.95, not at all a bad price for the nice sound the give you.

MACALLY NOISE CANCELING HEADPHONES

Ambient noise can be a problem almost anywhere. Chatty coworkers, noisy kids, roaring jet engines, it's enough to drive



you loopy. In steps technology with a solution, and cool technology at that. MacAlly has a set of noise canceling headphones designed to not only sound good, but also eliminate, or at least reduce, all the noise around you. They do this by picking up ambient sounds around you, and then generate a signal that cancels out the sound waves from outside. It works pretty well, too. For most room noise, you will immediately notice a difference. It works quite well on an airplane during flight. Take offs will overwhelm the unit, giving

you a static popping noise in the headset while the engines roar. Likewise, under very loud conditions the noise canceling feature will fail. A big old truck with a busted exhaust system will wipe out the capability instantly.

The hardware is a pretty nice compliment the noise canceling technology. White plastics make up the case and other pieces of the headset. Batteries go in the right ear cup, while the controls for power and volume are on the left. The ear cups are well padded, and will remain comfortable during extended wear, although if you've got big ears, you might need to take a break from them sooner than other users. The cord is detachable from the headset, a very thoughtful feature. If you break the cord, it is easily replaceable. Try not to do that, though, as the included cord has an in line volume control, giving you a break from trying to adjust it up on the left ear cup, or digging into your pocket to adjust it on your iPod. There is also an adapter for plugging the mini jack into an airline seat audio jack. Last, the headset folds up and fits into a compact little carry case, a cool feature over some other headsets of similar type, and at around \$70, MacAlly beats them all on price.

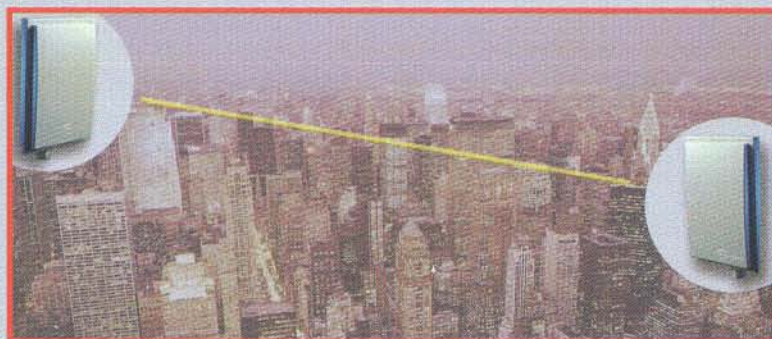
CONCLUSION

Whether you want to give that special someone a nice set of speakers, or have on your wish list something to let you tune out the world around you, any of the above audio systems will serve you and yours well. Their prices won't max out your credit cards, either.

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Fixed Wireless that Works!

By Jono Bacon

Toys

Cool toys for grown up, and not so grown up, geeks

SONY AIBO

When the AIBO robot dog was first released some years back, its birth was met with some cynicism regarding just how realistic a dog replacement the robot could be. Since those early days, the AIBO line of products has continued to develop and there is now a range of different models for different types of consumer. Although similar in many ways to a dog, the AIBO robot has been likened to a new life form that shares dog attributes, but benefits from being a robot (such as rotating its legs a full 360 degrees; a feat that dogs can certainly not do).

The AIBO robots comes in a variety of forms from the lower cost Macaron series with fewer sensors and capabilities to the ERS-210 series with more sensors and robotic dog styling. Additional models include the futuristic looking ERS-220, with even more features, to the brand new ERS-7, that includes a built in wireless card and improved sensors.

AIBO robots are very flexible machines and are comprised of a number of limbs and sensors that allow you to interact with them. In addition to these sensors, the AIBOs include temperature, distance and visual sensors to ensure that the robot always knows what is going on around it. The main AIBO units are very well built and are pretty sturdy, although it is not recommended to take your new cyber-pal out for a walk in a muddy field.

The range of emotions and responses from the AIBO is dependent on its brain; the Memory Stick contains the AIBO Ware software to bring your AIBO to life. This range of software includes the AIBO Life 2 product in which your AIBO starts life as a baby that cannot stand up or walk and needs constant attention, just like a real child. As you spend more time with AIBO, it will grow up and gain more skills such as standing, then walking, and then become more inquisitive about its surroundings. Included with the AIBO is a pink ball in a teenage AIBO can kick around and tap. Another AIBO Ware product is the Explorer memory stick. This product provides a fully-grown, inquisitive AIBO, with more capabilities and responses. A recent product has been the AIBO Recognition stick which will allow AIBO to recharge itself when it needs power by going over to the charging station (sold separately) and sit down to charge. When



AIBO is charged, it will get up and wander around as normal. The new ERS-7 robots are taking the AIBO concept further and include extra sensors (electro-static sensors that do not require pushing in), more LEDs, pattern recognition and the ability to pick up a small bone with its mouth.

Although certainly not cheap, the AIBO line of robots is a fantastic gift for someone who loves gadgets and electronic toys, and playing with AIBO is a true joy. The only problem you face is getting too attached to your little electronic companion....

PLAYSTATION2 EYETOY

Within the realm of game consoles, there have been many attempts to vary how you control the on-screen action. Attempts have included light guns, infra-red sensors, steering wheels, and dance mats, among countless other gimmicks. Recently, I have tried a new contender in this area, one that not only changes the way you use your PlayStation2, but is also incredibly fun.

The Eyetoy is a small black web camera that plugs into a USB port on the front of the console. Included in the package is

a game disc that has over 10 mini games where you interact with on-screen characters using yourself as the controller. The games on this disc vary greatly in what you need to do, but highlights include the soccer game in which you keep a ball in the area using your head, a boxing game in which you fight a robot and a karate game in which you fight off legions of miniature ninja's intent on kicking you in the head.

The Eyetoy is not only a fun addition to your PlayStation2, but is immensely fun to use. When I first received the unit through the post, I was expecting it not to work quite as well as I was anticipating. To my surprise, the EyeToy works very well at interpreting your image and actions within the game that you are playing. As is the case with the dance mat, the Eyetoy really comes into its own at parties and gatherings as you marvel at Uncle Bill punching at thin air. If you want to make a fool of yourself and have some great fun while doing it, the Eyetoy is highly recommended.

PLAYSTATION2 NETWORK ADAPTER

When the PlayStation2 was first released, there was much fanfare about its up and coming network gaming abilities. As is typical with commercial products, the network adapter was held back for quite some time before its eventual release. The finally released adapter is a sleek black box that slots into the back of the PlayStation2 and provides the various necessary network connections. If you are based in the USA, there are modem and Ethernet connections, and if you are based in Europe, you get just the Ethernet port.

Included with the network adapter is a start-up disc that to get you connected to the Internet and some software to access the PlayStation2 gaming portal from your console. Settings for your network access are stored on a memory card, and the start-up disc has a number of DSL/Cable providers already included, so installation is a snap.

The range of online games capable of supporting the adapter is increasing all the time, and a number of publishers have confirmed titles that will be available in time for Christmas. One of the most popular of these games has been SOCOM: Navy Seals; a first person perspective action game that includes a USB headset with which you can talk to your team members to develop attack strategies.

The network adapter is ushering in a new era of game play for PlayStation2 owners. Although the other consoles have their equivalent products, the PlayStation2 has secured a number of publishers to create online content, and it looks as if online gaming will be a pre-requisite in future game titles.

BELKIN 54G WIRELESS ACCESS POINT

Wireless networking is fast becoming a standardised and popular method for networking machines together in the home and small office. The most common method used to implement a wireless network is to buy an Access Point and plug it into your LAN. Although a simple solution, access points have been limited to the 802.11b standard which can transmit data at 11MB/s; suitable for sharing internet connections and small amounts of data, but not suitable enough for transferring large files across your network.

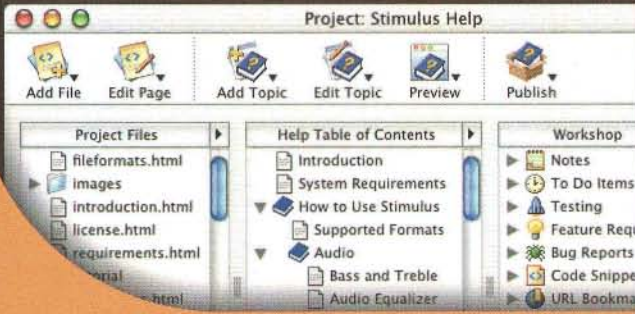
The Belkin 54g Access Point was one of the first products to implement the 802.11g, or Apple monikered Airport Extreme, standard. The unit actually implemented the draft standard before that standard was finalised. Despite that, it works well with products using the now finalised 802.11g standard. Additionally, an upgrade patch is available from the Belkin website. This standard increases the bandwidth of the unit to 54MB/s and still supports 802.11b devices. It is important to remember however when discussing wireless devices, that 11MB/s and 54MB/s refer to the fastest theoretical possible speed, and obstructions such as walls, ceilings and doors can all reduce the signal throughput of the access point.

The Access Point is simple to install and merely requires plugging it into the back of a hub or network card. The unit provides you with a variety of features such as WEP and WPA encryption, MAC address filtering, upgradeable firmware and a variety of other features, all controlled by a web based interface. With the unit plugged in you just need to obtain an IP address, and you can connect to the network.

For most home users, wireless technology is useful for preventing unsightly cables being dragged around the house and drilling holes in the ceiling for computers upstairs. Although not the most expansive of access points on the market, the Belkin 54g provides a simple means of getting your wireless network up and running in no time at all. If you are going to consider giving this as a present or asking your nearest and dearest to get you one, don't forget to also include a request for one of the Belkin 54g network cards (PCMCIA and PCI version available) so you can connect as fast as possible.

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electric butterfly

By Michael R. Harvey

Gadgetry

Just cool and interesting stuff to give or get

There is always a large selection of possible stuff to give or get during the holidays. From bath towels, to luxury SUVs. Following are a few choices that fall somewhere in between those extremes.

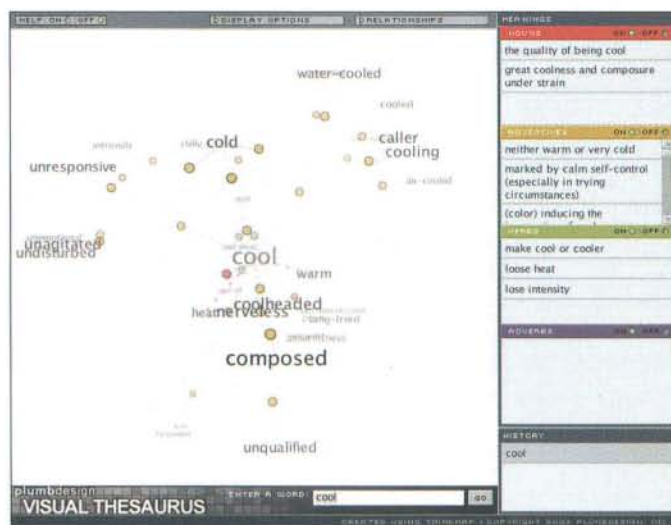
IBOOKENDZ

The folks over at Photo Control Corporation (www.bookendzdocks.com) have their fingers in several pies. The one that we are most happy with is the BookEndz line of products. For years now, these guys have been making docking stations for many of Apples laptops, from the 1997 G3 all the way to the current 12 inch aluminum PowerBook. We looked at the ones they have for the Dual USB iBook. It's a small, compact, rectangular box that simply plugs into the ports on the left side of the iBook. It is available in both white and black. And, it just works. Plug the BookEndz into the iBook before turning it on, and you are set. Plug once, instead of two, three, or twelve times. It's really, really, handy. FireWire, USB, network, and modem are all there. The RGB connector on the iBook is converted to a VGA connector to make it easier to attach an external monitor. Likewise, the A/V connector is converted to RCA jacks for audio left, right, and video. The only caveat with the iBookEndz is that it won't work with s-video on the iBook May 2002 model. The white colored iBookEndz is \$159.95, and the black colored dock is \$144.95. Anyone who has a PowerBook will find one of these docks incredibly useful, and would just love to get one for the holidays (hint, hint).

VISUAL THESAURUS

This application began life as a web-based tool in 1998. Since then, Plumb Design (www.visualthesaurus.com) updated it, and released it as a stand alone product earlier this year. Visual Thesaurus, as its name indicates, provides you with a graphical way to find words, their meanings, and their synonyms. It uses the WordNet database provided by the Cognitive Science Laboratory at Princeton University (www.cogsci.princeton.edu/~wn/). It handles English language words only.

It is, if nothing else, a unique approach to looking up words. While moving over to another program in order to look up a word is less than ideal, having to move over to this program



may make it not quite so hard to deal with. Can you find the synonym to that word to need to make deadline? Sure, although because of the graphical nature of the presentation, it may be more difficult than usual to find exactly what you are looking for. That doesn't necessarily seem to be the point of this program, however. I found myself just exploring related links to words that jumped out at me. It became a fun sort of game to follow along a random selection path to find out what would pop up next.

Visual Thesaurus is available directly from Plumb Designs web site for \$29.95 (plus shipping and handling if you want them to send you a CD).

TRANSPOD

When the guys at Netalog, Inc. (www.everythingipod.com) came out with the Transpod, I thought it was, hands down, the best iPod accessory ever created. I still think that. This device is a combination FM transmitter, and iPod charger for use in your car. It plugs into the cigarette lighter of your vehicle, eliminating the need for any cords or wires. It can be set to any FM frequency to allow you to broadcast your tunes on your car stereo. By law, the transmitter is very low power, so you pretty much have to have the volume nearly maxed on your iPod, and radio, in order to hear the music. The kit comes with the main body of the unit, a mounting bracket (if you want to screw a bracket to your

dashboard), a power cord to plug the dash mount into power, the articulating arm for plugging the unit into a car power adapter, and last, an extender arm so you can place the Transpod in a usable position even when your cars power adapter is in an out of the way location. The one thing to note about the arms is that while they can be adjusted up and down, there is no left and right articulation. This proved to be somewhat distracting when trying to read the screen, and having to lean over to do so. This device is \$89.99 direct.

That's not all, however. Soon after the release of the Transpod, Netalog came out with the Transpod 2. Similar to its predecessor in appearance, but designed to give you a one piece solution to hold and charge your iPod, while letting you plug the setup into either a cassette or direct audio plug. There is no FM transmitter in this model, but for what it does, you don't need one. IT comes with the same parts as the original, but also adds the cassette adapter, and direct connect cables. Obviously, a direct connection garners better sound quality than FM, so you get as good a listening experience as your car stereo system can produce. This version of the Transpod is available for \$59.99.

FIREWIRE 800 HARD DRIVE

The folks at WiebeTech are the answer to many technicians dreams. They have a range of products designed to make the administrators life a little easier. The MicroGB800 hard drive (www.wiebetech.com) is a truly outstanding gift choice among their offerings. This miniature portable drive has dual daisy chainable FireWire 800 interfaces, and a USB 1.1/2.0 interface. It can be either bus powered, or run off the included AC adapter. A FireWire 800-800 cable, FireWire 800-400 cable, and a USB2 cable are also included. USB operation requires the AC adapter. The drive is plug and play without drivers under OS 9, and Mac OS X (you can boot from this drive on the Mac OS), not to mention Windows 98SE, ME, 2000, and XP. A very nice carrying case is included, which gives the drive case a bit of protection from scratches. FireWire 800 operation requires a FireWire 800 host, otherwise the connection speed will revert to FireWire 400 automatically.

There are a range of options and pricing for this drive. Starting at \$159.95 for an empty, install your own drive, case, up to \$449.95 for an 80 GB 4200 RPM drive. There is one higher option that WiebeTech recommends for getting the most out of the FireWire 800 connection. A 60 GB, 7200 RPM drive for \$529.95. Anyone who needs to move a lot of data around, and needs high speed access to it will find this stocking stuffer invaluable.

iSLEEVE

The iSleeve is Terforma's entry into the iPod accessory market. These folks have produced a carry case for both original and newest iPods that is supposed to be "a sleek, protective rubber case for business-to-sport versatility, but also unfettered access to the iPod's dial interface and display" according to the press release. And that is a fairly accurate

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description of the unit. The main rubber case that surrounds your iPod is fairly sturdy, as is the plastic back panel. The rubber has openings to allow you access to the ports on the iPod. The case has even been molded to allow an iTrip from Griffin Technology (www.griffintech.com) to plug in without removing the case, a nice touch creating a product to allow easy use of other company's stuff. Installing your iPod into the case is simple. Visual instructions are provided, as are padded strips to help get a custom fit for your particular iPod. Getting the iPod in and out is easy, but the case still holds it securely, so you don't need to worry about it falling out. The back panel has both a belt clip, and a hand strap for holding it while exercising. It is also designed so that you can store your ear buds out of the way, but easily accessible. Getting the ear buds in and out takes a bit of getting used to, but it's not impossible. Access to the dial and buttons is better than most other cases and sleeves for the iPod out there. The iSleeve comes in black and white, and has versions for both the original and new iPods (named G1 and G2 respectively). The iSleeve is available directly from Terforma for \$49.99.

FRIENDLYNET FR1004AL WIRELESS ROUTER

Okay, so the 802.11g wireless standard, née Airport Extreme, is the coming thing. That doesn't mean, however, that the 802.11b standard is ready to be cast aside. There's a ton of plain old Airport need still out there. Over the last several months, I have looked at several different 802.11b wireless routers. The FriendlyNET FR1004AL was my overall favorite. Many of the models I checked out had something to recommend them as well as detractors, the Asante offering included. The FR1004AL came out ahead overall, with the best set of features, and the fewest issues to complain about. Physically, this router is great. The case is good, sturdy metal (not flimsy plastic, like most others). The antennae screw on securely, and are also of good quality. This router was the only one I tested that had four ports on it. Most had only two. So, for the FR1004AL, you most likely wouldn't need to put a hub in to handle multiple computers. The range on this beast is great, better than any other router I tested. I literally walked out my front door with my iBook, and down the street a full block before losing the signal. It's got really good signal strength, too. A few others had higher overall signal strength, but none had that in combination with its range. On the inside, the software is uber simple to set up. It almost does itself. And, that's about where it ends. With



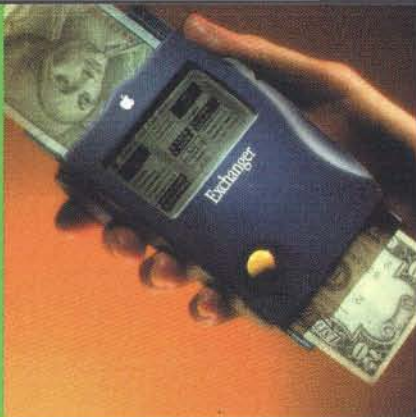
this router, you don't have the depth of settings you have with some of the other offerings out. That said, what you can do with it is likely more than enough for most. Everything is done via web interface. This router is definitely the perfect gift for that special someone who needed to unplug from the wall. The FR1004AL can be found at many online stores for \$90 to \$100.

CINEMA LIFT ARM

Now this one is really cool. One thing about the Apple displays that always bugs me is their very limited adjustability. This product takes care of that problem in marvelous fashion. Innovative Office Products (www.lcdarms.com) has several different styles of lift arms for taking LCD monitors up off the desk, and they have created one specifically for Apple Cinema and Studio Displays. These ridiculously sturdy, metal arms have 360 degrees of swivel at all three joints, provide 18" of vertical movement, 27" of horizontal movement, and 200 degrees of tilt. Wire management is handled by threading cable through the arm itself, or via plastic snap on ducts, and clips. The kit has easy to follow instructions, and all the parts, and tools, necessary to put the lift arm together to get it off the table. The only alteration you need to make to the Apple display is to remove the rear support arm by taking out three screws, then pulling off the arm, and a plastic cover from the hinge. One cool thing about the kit is that parts are included to mount the arm any one of several ways. It can be either wall mounted, mount to the desk with a clamp, or anchored to the desk, if you are willing to drill a hole into it, among others. Once the device is assembled, you will need to turn a few screws to get the tension, and pneumatic cylinder adjusted for the weight of your display, but that's it. Your LCD is floating above your desk, and can be easily adjusted to any height and angle you need.

There are two version of the arm. The CinemaLift is for the 20 and 23 inch displays. The StudioLift is for the 17 inch Apple display. The cost of the CinemaLift is \$369 with the StudioLift being somewhat less.

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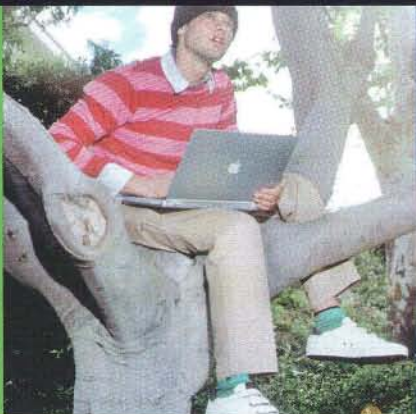
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By John C. Welch and Michael R. Harvey

See

If seeing is believing, then believe these are great gifts

INTRODUCTION

Well, as the gift giving season rapidly approaches, we hit the decision that faces everyone who knows a Mac user...what the heck to buy them that won't break the bank? Well, thanks to the efforts of at least two companies, there's an easy gift for any Mac user with a reasonably fast machine: a FireWire web camera.

THE iSIGHT

As anyone who hasn't been living under a rock knows, the Apple iSight, and its attendant iChat AV software, has suddenly made video conferencing fun for people who aren't geeks. Now, Apple didn't invent videoconferencing by a long shot, but thanks to a willingness to go the extra mile, there is now a package that makes it far less painful. However, this is not an iChat AV review, even though it's an obvious topic when you're talking about the iSight. We're going to attempt to talk more about the cool things you can do with the hardware.

As part of that, we should probably cover the very few things you can't do with it, namely use it with iMovie, Final Cut Express, or Final Cut Pro. The iSight doesn't use the correct signal type for those applications to talk to it. However, that doesn't mean you can't make use of an iSight if you have those programs, it just means you have to use an intermediary application, some of which we'll cover later.

Basics

The iSight resembles...well, an electric razor with a lens instead of a handle. It's a cylinder, about three inches long, and around an inch or so in diameter. It uses FireWire for it's connection, and comes with a set of strain relief/mounting clips that wrap around the included FireWire cable to help secure the iSight to the three mounts that are included with the camera, and brings us to our first of two complaints about the hardware.

First of all, the clips that secure the iSight to the mounts are pretty cheesy. While we understand that Apple had to make them easy to disassemble, in the months we've had the iSight, we've almost lost the two pieces many times. They slide together around the cable, but until they are attached to the iSight, they



come apart far too easily, and are too easily lost in the depths of a laptop bag. They really seem to have been designed for someone who will mount the iSight once, and never move it from that mount. This makes sense when you consider the mounting hardware.

The iSight comes with three mounts, one for laptops, one for Cinema Displays/iMacs/LCD displays, and one for eMacs/CRTs. Now, the laptop mount is pretty sweet. It clips onto the top of the screen, so it's at the all important eye level, and has a knurled thumbscrew to securely clamp the mount, and the iSight to the screen. The design is well thought out, and doesn't intrude into the actual display area of the laptop screen, even on a TiBook. However, the other two mounts are not nearly as well thought out. They attach via two-sided tape, so once you attach the mount, that's where it stays. Let's review this: you buy a \$149.00 camera for someone who owns a multi-thousand dollar Cinema Display, and you want them to glue the camera to the display. Um, no. Even without the aesthetic concerns, adhesive mounts are a right proper pain if you ever have to readjust them, and we have yet to see an easy source for just mounts. Come on Apple, you win awards around the world for industrial design, and your solution for using an iSight with anything but a laptop is three bucks of Lucite and carpet tape? It definitely puts a damper on the user experience.

Using the iSight

That aside, however, the iSight itself is a handy bit of work. It's unobtrusive, and has a very obvious, (and very welcome) way to tell you the lens cover is closed, and the camera shut off. When you rotate the end of the case counterclockwise, a white lens cover snaps into place. Perfect for those times when you *don't* want the world to see you in the flesh. The auto focus works well enough for it's intended use. You aren't going to film a football game with it, but why would you want to? While iChat AV may not allow you to adjust gamma, and other values for the camera, there is other software, such as QuickTime Broadcaster that can.

THE FIRE-I

The Fire-i web camera, from Unibrain (www.unibrain.com) is almost the anti - iSight. It is highly compact, \$50 less than the iSight, and needs only one extra mounting part, which you'll likely leave attached to the camera once installed. The Fire-i, with the clip attached, is a cube about 1.5 inches to a side. It has two FireWire ports on it, making it very valuable for mobile users. You can plug the cam in, and still have another FireWire device attached through it to your PowerBooks single FireWire port. The Fire-i can accept power from either the bus or you can plug your own power directly in to the cam. It has a manual focus control, and no shutter.

This camera was designed mainly for use with laptop computers. Its clip will hold the cam to most any laptop screen, and even has pins inside it so that the camera won't slip too far down on the screen case, avoiding the possibility of it pressing down on the screen itself. The clip, which swivels 360 degrees, also has a great deal of tilt capability. This allows you to set it up on a desk, or monitor.

There are two areas where the Fire-i comes up a bit short. One is that it lacks a built-in microphone. In order to use voice, you have to either use the built-in mic on an iBook or PowerBook, or attach a third party microphone. This not a deal breaker by any means though, as the high picture quality, and portability more than make up for this missing feature. The second issue we ran into concerns the focus knob that surrounds the lens. This more of a warning than a complaint. The spring in the clip is pretty strong, and it takes a bit of work to open it up. Your thumb will naturally fall on top of the focus knob when you are squeezing the clip open. When we did this, we jammed the knob straight into case of the camera. Everything still worked fine, but a small clip broke and now the focus knob can slide in and out of the case along the lens. Be careful not to put any pressure on that knob.

There is a nice set of software goodies bundled with this web cam. BTVPro (discussed below), as well a few others. WuffCam (www.wuffwuffware.com), web cam software designed to broadcast images to Rendezvous capable browsers, or upload images for the web, as well as a few other features built in to a simple interface. A beta of SecuritySpy (www.securityspy.com), a video surveillance application with features such as multiple

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camera support, motion detection, and live video streaming over networks. And last, the ISpQ Video Chat client.

Despite not having a microphone, the Fire-i is great little camera, with superior image quality, and a nice bundle of software to use with it. And, of course, it works flawlessly with iChat AV.

SOFTWARE

Once you get past iChat AV, though, there is a lot of really neat stuff you can do with one of these cameras. They work perfectly with QuickTime Broadcaster and QuickTime Streaming Server, so if you want to set up a web broadcast to more than one person, or set up a streaming web cam, then just install Broadcaster and the streaming server, and you're set. (While you normally have to buy Mac OS X Server to get QuickTime Streaming Server, just download Darwin Streaming Server if you want to use it with Mac OS X). It takes about five minutes to set up Broadcaster and QuickTime Streaming Server, and once you do, you can talk to millions, just like Steve at a keynote. This is also quite handy if you want to set up a hidden camera system. Get some cameras, some iBooks, (while an iBook is marginal for iChat AV, for QTSS, it's fine), place the cameras, and you've got a nice little QuickTime Surveillance System that you can use from anywhere with a decent internet connection.

However, if you want to use either web cam as a low - budget FireWire DV cam, you can do that with a handy little package called BTVPro, from Ben Software, (www.bensoftware.com). BTVPro allows you to use the iSight or Fire-i as a DV Cam of sorts. It also has a really excellent motion detection system that can turn on the camera and record when the motion in the camera's field of view hits a predetermined threshold. Just the thing for making sure your roommate is staying out of your Cheetos stash. Even better, BTVPro, *unlike* iMovie or any video editing applications from Apple is scriptable, including the motion detection, codec selection and settings, and DV Tape device control. So with

BTVPro, you can record the video from the Fire-i or iSight to a DV Tape, and because it's scriptable, you can control this from other applications. Again, while security/surveillance may not necessarily be a common use for one of these cameras, with the right software, it would be a very functional little tool for this kind of work. John has some law enforcement friends who are rather interested in using an iSight for just this purpose.

VIDEO CONFERENCING

Since we have mentioned iChat AV a few times, we should talk a bit about how well the iSight and Fire-i perform as videoconferencing tools. "Quite well" would be the smarmy answer. They really do a serviceable job, and iChat AV is one of the easiest applications to use for this kind of task. The only thing we would say is that if you are going to use iChat AV a lot, we'd really recommend getting a headset / mic combination. The iSight's internal audio circuitry can get a little overworked if there's a lot of background noise when you are talking to it, never mind that the Fire-i has no audio capability at all, and requires other hardware for audio input. We have used the PlainTronics 300 USB headset with them to great effect, especially the mute button on the headset! Besides audio quality, a good headset allows you to avoid the temptation to turn an iChat AV session into a long distance phone call to Europe circa 1949: "WHAT? HOW ARE THE SQUIDS? WE DON'T HAVE ANY SQUIDS...OH, KIDS...THE KIDS ARE FINE...NO, NOT IN LIME, FINE!". Just be careful with the distance between the mic and your mouth, or you end up sounding like a reject from a Darth Vader audition. If you need to video conference with folks who don't have iChat AV, your options are a bit more limited. Yahoo works well enough for video, but we have yet to get the audio to work on that program. There are some others, like SquidCam, but again, both sides have to have the same program in most cases, so if you want to do a lot of videoconferencing, some judicious research into what the people you will be talking to are using is a good idea. As is bandwidth. While in theory you can get at least voice chat to work over a 56K dialup, it's going to be very spotty, and sound rather poor. You really need at least a decent DSL or Cable Modem connection if you are going to be using any of these web cams for more than a few seconds at a time.

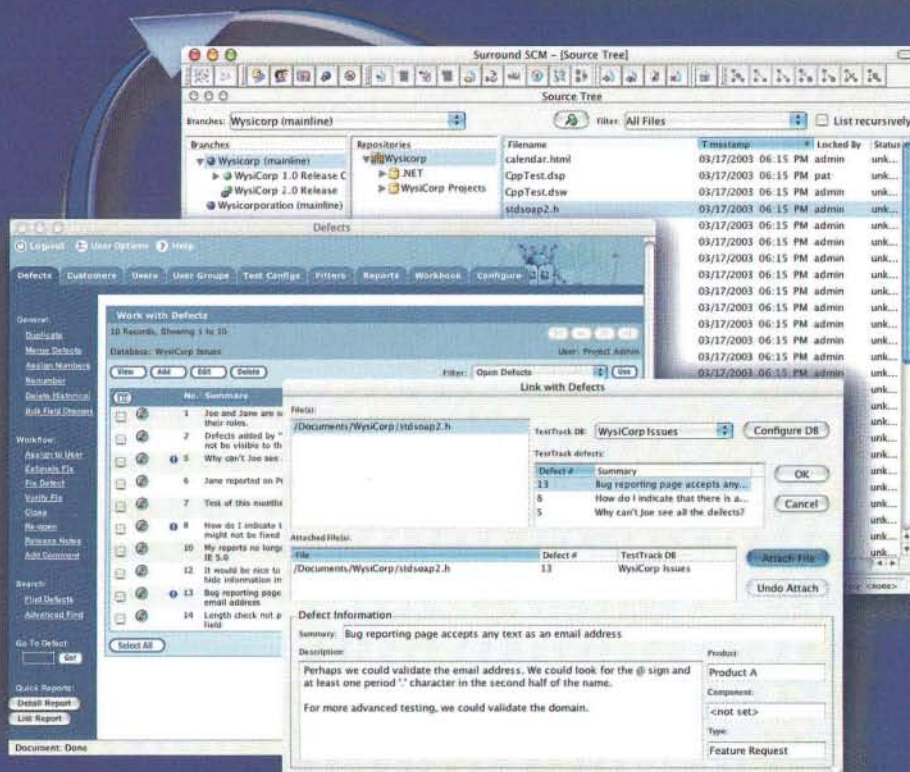
CONCLUSION

As gifts go, you can do a lot worse than one of these web cams. The Fire-i is a good option for full time PowerBook users, as it is very small, and you already have a mic integrated into the PowerBook. The iSight is a great choice all around, even if it is rather bulkier than other cameras. They are relatively inexpensive, work well, and can be put to some fairly innovative / demented usage. And if you really want to make a MacTech columnist's week, well, John will happy to help you with that. Just use the email address at the top of the article ;-)

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By Ilene Hoffman

Share

The gadgets to help you share those moments of life

How often do you take pictures at a gathering, and promise to send copies of the prized photos to the other folks? Do these copies ever make it to your friends and family? My guess is no.

So, my first gift recommendation is, of course, a nicely priced digital camera. Generally speaking, you can't go wrong if you buy a digital camera from any of the major companies, such as Canon, Olympus, Nikon, Fuji, Pentax, or even Sony. I own old Fuji and Olympus digital cameras, and I've been very happy with both of them. I also own Olympus, Nikon and Pentax film cameras, but won't buy another Olympus film camera. Three of the Olympus film cameras I've owned didn't make it past the second year of use without breaking. My basic Olympus Stylus, with a glass lens has performed well and I recommend it highly for a little travel camera (about \$80).

Olympus digital cameras seem a bit more robust and with their zoom capabilities are more versatile. My Dad swears by his. Nikon's Coolpix digital cameras are highly praised by their owners (and I know quite a few). One of the recent Nikon CoolPix cameras, the 5400, is particularly nice. It is practically a professional grade camera, with a full range of functions, as well as add-ons and lenses. The 5400, however, doesn't quite fall into the nicely priced category. I've found the Fuji digital cameras to perform exceptionally well in poorly lit situations.

The bottom line is, you need to try the cameras out at a store prior to buying. I'm very picky about the eye piece and prefer Nikon's viewfinders. You should also look for a digital camera that is has at least a 3 mega-pixel resolution, so that you can produce good looking prints. Lower resolution cameras are ok for posting onto the Internet, but you can't really edit them to produce a decent 4 x 6 close up shot. A 3-megapixel camera can produce a good 8 x 10 photograph, if needed. Digital Camera HQ has a comparison page of many 3 mega-pixel cameras at:

www.digitalcamera-hq.com/3-megapixel-digital-cameras-ratings.html

Although, I'm usually not prone to recommending stores, I do want to make note that the Ritz Camera chain has an



honorable 30-day money back guarantee, even on expensive cameras. Most retailers only have a 7 to 10 day return policy.

If you have a digital camera, there's an easy solution to the "Where's that photo you promised me?" problem, which is my second gift recommendation. Hewlett Packard makes this little 2.9 pound printer that is a mere 9.1" x 4.4" x 4.9," so it can fit into computer bag easily. The HP Photosmart 245 compact photo printer has built-in slots for every type of digital media (CompactFlash, Microdrive, SmartMedia, Secure Digital, MultiMedia, Memory Stick, and xD-Picture Card). The built-in 1.8-inch LCD screen allows you to scroll through your pictures, do basic editing, and pick and choose your prints. A contact sheet with tiny thumbnails is also a print option. Basically, you just plug in the printer, pop in your media, hit print, and you're good to go. Can it get any easier than that?

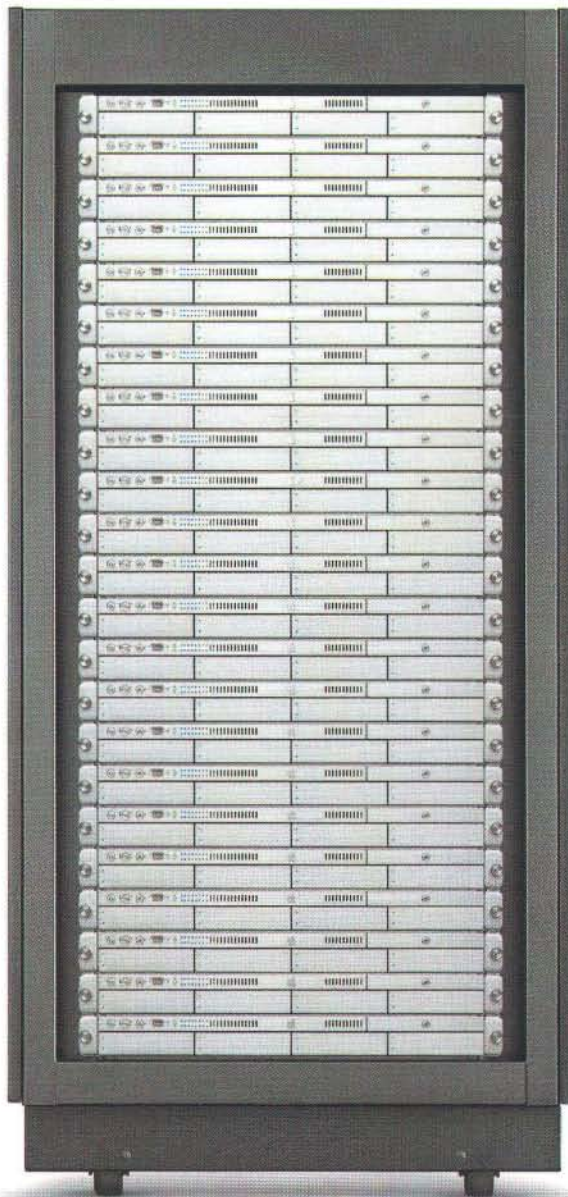
The printer is fast, convenient, prints excellent quality pictures on Epson and HP 4" by 6" photo paper, and is one of the simplest printers to set up that I've ever used. It is a little pricey with a \$199.99 MSRP, but if you want to forego the LCD display, you can get the Photosmart 145 for \$149.99. The LCD screen makes the stand-alone unit more usable, though. Both models also connect to your computer with a USB cable that you supply.

Sharing those captured moments of life is always a great gift, and giving, or getting, the cool tools to do it is even better. Nearly any digital camera, and one of these printers, will turn you into a one person, photo producing machine in no time.

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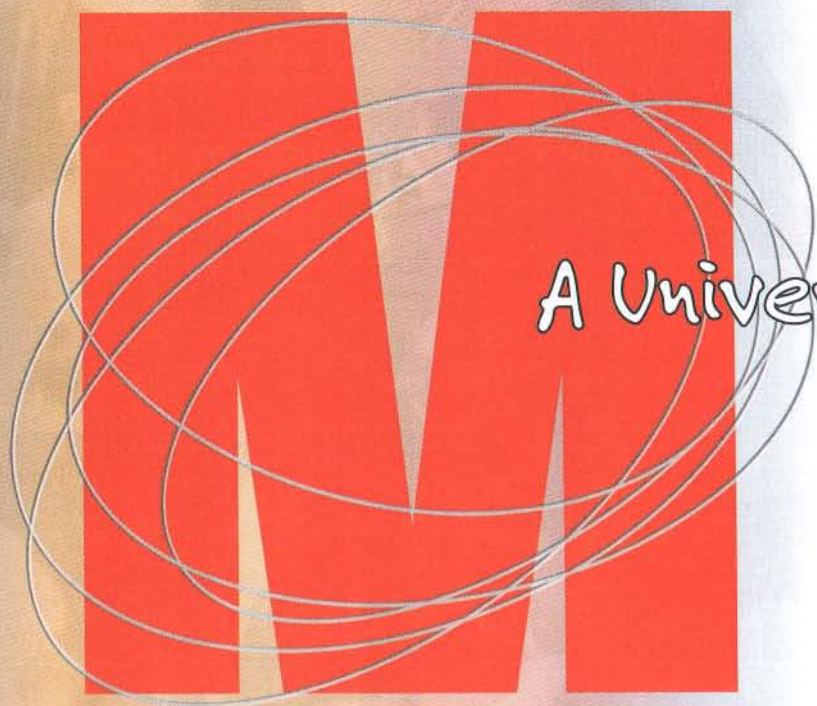
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By Michael R. Harvey

Play

Fun time

You simply can't spend all your time in serious work stuff. I don't care what the 7 Habits say, sometimes you just have to goof off. No doubt you have heard of the big boys in the gaming field, Aspyr, and MacPlay. They aren't the only one out there, though. Following are a couple of options you might not normally run across.

SPACEWARD HO!

Back in the day, my boss bought version 4 of this game for all the senior staff in the office. Countless hours were lost playing this addictive little strategy game. Earlier this year, Delta Tao finally released version 5. It's a Carbon app for both OS 9 and Mac OS X, and I've once again lost more hours than I care to think about to this game.

As I mentioned, this is a strategy game. The basic idea is galactic conquest. The interface is very intuitive, and easy to figure out. You spend your time enjoying the game play, not supervising the minute details of empire building, and resource management. You build your fleet, move from planet to planet, beat off your enemies, terraform the worlds you can, and strip mine the ones you can't. Sliders let you set how much of your resources you will save and spend on technology, with that amount being divided among what type of technology you want researched. The game is turned based. So, you build, move, and do all the things you need to, then end the turn. After that, the other computer players go, and you get the results in messages, and battle scenes once your turn comes around again. A nice feature of the game is Internet play. You can hook up with others on the Internet, and battle them directly, giving you something besides computer controlled opponent once in a while. The graphics are simple, but eye catching. This really a fun game to spend some down time playing., and at \$XXX directly from Delta Tao, it's a bargain.

ESCAPE VELOCITY: NOVA

Now, this game, From Ambrosia Software (www.ambrosiasw.com), is a real winner. Nova is the third installment in the Escape Velocity series, and the first to run on OS X. This is a kind of hybrid game. There are elements of

strategy, combat, and story telling in the game. It doesn't fall too much into any one genre. You play this game as one person try to make your way in the galaxy. You can trade good, ferry passengers, become a pirate, any number of different things. There are also story line laced throughout the world you will visit. Take one of them one, and you get to improve your lot while doing some good deed (or not so good, as the case may be) for the other denizens of this place. Improving your lot mainly means getting a bigger and better ship to move around the game in. Better weapons, faster drives, more fuel, that sort of thing. There are so many little details that make this game really fun, that they just can't be listed here.



Escape Velocity: Nova is \$XXX, directly from Ambrosia. But, it doesn't end there. The architecture of the game allows for plug-ins to expand and enhance the fun. In fact, Ambrosia re-released the original Escape Velocity, and EV: Override as plug-ins for Nova, so now you can go back, and play those earlier games, and lose even more time to this fun.

GAME OVER

Don't just limit yourself to these two offering from these developers. Each has other games, and even useful utilities, to check out. You may find that one game, or, dare I say it, tool you need, or you know someone else on your gift giving list can't live without.

MAC OS X PANTHER

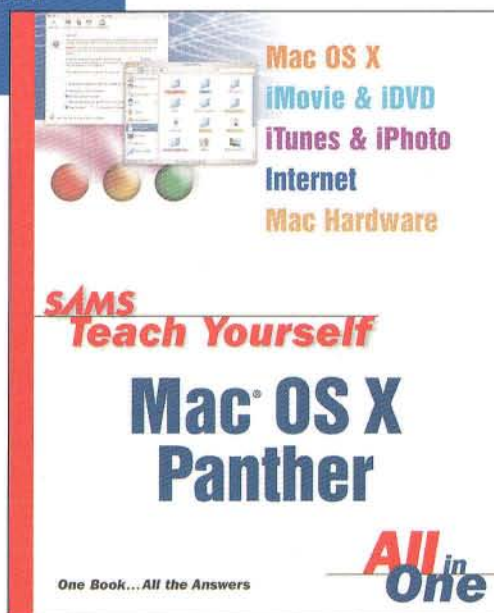
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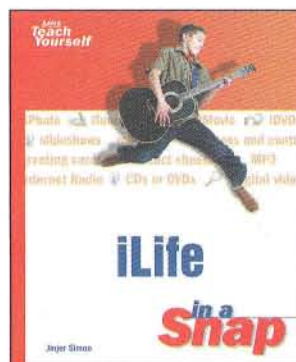
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By Sam Crutsinger

Wear

Look cool while giving all the great geek gifts

Geeks love Hawaiian shirts. I know, I know, you're looking for electronics in this guide, but I've gotta say that in my experience, geeks love funky shirts. And why not close out MacTech's 2003 Gift Guide for Geeks with something a little different than what you'd expect to find here. There are many vendors online that can accommodate wide range of prices and styles, from tasteful to tacky.

Believe it or not there are a few rules to aloha shirts. These are generally ignored by most, but some devout aloha shirt collectors head straight for the pocket and the buttons like a wine taster checking the cork. The pocket should match the background pattern. It should blend in so you can't see the pocket is even there from a distance. The buttons should be made of coconut. That about covers the basic requirements for the snooty shirt collector.

There are many great places to pick up shirts on the web and at a variety of prices.



Reyn's (www.reyns.com) is one of the more stalwart shirt companies out there. They produce over a hundred original designs every year so you should surely be able find something nice at their site. Their shirts averagely priced at about \$50-80 depending on the shirt.



If you're shopping with a tighter budget then you might try Lots of Aloha (www.lotsofaloha.com) which has many shirt designs for \$17.89-30.00.



A site with a very large catalog of aloha apparel is Paradise on a Hanger (www.hotshirts.com). They have shirts from as little as \$20 all the way up to \$250 premium, limited edition designs.

You can even get some over at Target where we bought most of our TackyShirt wardrobe. They tend to be seasonal items, however, and December is just about as far out of season as it gets. If you try there, you are likely to find pretty slim pickings.

Typically, I'm against giving clothes for Christmas. You never get the right thing, it's always the wrong size, on and on. However, if it's something with character, then that's a different story. Socks are just socks, but a day-glow, button-down shirt covered with palm trees and hula girls will put everybody around you in a good mood. Just make sure you can get it in XXL, which is the typical size for most of the geeks I know. Oh, and I'm partial to red and black if you're buying for me.

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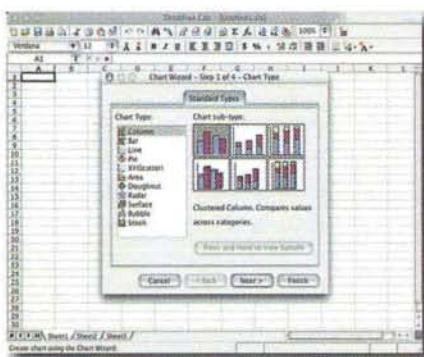
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By Dave Wooldridge

Turn Your Web Site into a Marketing Machine

Web Page Essentials for Promoting Your Software

Last month, we kicked off this series with a quick overview on the importance for shareware and commercial developers to see the “big picture” when planning a new product. All of the decisions you make during the development phase directly affect the marketing and lifespan of your product. Establishing a brand identity and positive first impressions for your software are just two of the many crucial elements needed for a successful product line. Another valuable element that was briefly discussed was the presence of a professional web site for your software company. This month, we’ll explore several marketing tools and techniques that you can integrate into your web site to help increase awareness and sales for your software.

PITFALLS TO AVOID

First, let’s review what should NOT be included on your software web site. Photo galleries of your favorite supermodels, dissertations on why Wolverine is the best X-Men character, a web shrine dedicated to U2, and digital pictures of your family trip to Hawaii are just a few examples. These are all highly acceptable forms of self-expression, but by posting them on the same site as your software, you’ve just slapped a huge scarlet letter “A” for “amateur” on your virtual software company. To some of you, this may seem incredibly obvious, but many shareware developers listed on VersionTracker.com continue to make the mistake of including personal interests on their sites.

To blog or not to blog... While blogging has become one of the Internet’s hottest new trends, the very nature of its diary-like “soapbox” can lead to negative reader reactions. And if a potential customer does not agree with your world viewpoint, they may react by choosing not to buy your products. So should your blog reside on your software web

site? It depends on how you use it. If you utilize the web blog to inform users on the development status of a particular software project, then blogging may work to your advantage in establishing a close relationship with your customers. But if you post opinionated entries about religion, politics, or even something as innocuous as the software industry, then you run a good chance of offending someone out there and losing a potential sale.

ELEVEN WEB SITE ESSENTIALS

Last month, several marketing concepts were illustrated through the creation of a fictional software product named CodeQuiver. **Figure 1** shows a mock web page for CodeQuiver with numbered arrows pointing to each one of the eleven web site essentials. You’ll want your web site’s interface to have its own unique design, but hopefully, this template will serve as a helpful guide when deciding which components and features to include.

1 – INTUITIVE SITE NAVIGATION

Building an easy-to-use menu system for your site will allow your visitors to travel freely through your pages without getting lost. Placing a global menu on every page of your site prevents the need to backtrack to the home page just to visit another section. A user’s online experience at your web site should be as painless as possible. If people become frustrated or impatient while exploring your site, their negative mindset may taint their first impression of your software. To keep things running smoothly, maintain a simple and intuitive design. CodeQuiver’s site navigation (**Figure 1, Item 1**) is a very basic tabbed menu. Visitors always know where they are since their current location is marked by a highlighted, yellow tab. Visitors also have access to any other section of the site via the gray tabs.

Dave Wooldridge is the founder of Electric Butterfly (www.ebutterfly.com), the web design and software company responsible for Stimulus, HelpLogic, UniHelp, and the popular developer site, RBGarage.com.



Figure 1. A fictional web page for CodeQuiver. Items 1–11 represent a handful of essential elements that can help you turn your software company web site into a marketing machine.

Another advantage to a global site menu is to encourage impulse purchases of your other software titles. A consumer may have come to your site to buy a specific product, but with your other products only a single mouse-click away, that person may decide to take a quick look. And if some of your customers walk away with two or three purchases when they only came to buy one, your site navigation has proven itself to be quite effective.

For those of you who feel artistically-challenged, the design of your site interface does not need to be complex or intricate. In **Figure 1**, the most complicated image on the page is the product logo. The rest of the page uses very little imagery. Some of the most attractive software pages

available online are those that appear simple, clean, and most importantly, easy to read. Just look at Apple.com's minimalist design. Its white, uncluttered pages appear very elegant and professional.

If your site currently includes hundreds of web pages, a "drill-down" menu approach to your site hierarchy may still not provide convenient direct access to important pages. For large sites, many developers contemplate the use of a site-wide search engine. Depending on what scripting languages your web server supports, there are dozens of freeware and shareware options available online for Perl, PHP, ASP, JSP, etc.



Figure 2. You can add free, customized Google SiteSearch to your web site in only a matter of minutes.

If your web hosting account does not currently support CGI or server-side scripts or if you have very little experience



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coding web-based scripting languages, then you may want to check out Google's free SiteSearch service at <http://www.google.com/searchcode.html>

With only a few lines of HTML code that can be easily pasted into your web pages, Google provides you with a free turn-key site search solution that can be up and running in a matter of minutes.

For the ultimate in customization, you can also sign up for the next level in Google's free SiteSearch service, enabling you to tailor Google's search results page with your own company logo and site colors. To see an example pop-up window of a customized search results page, see **Figure 2**. To sign up for this advanced free SiteSearch service, visit <http://www.google.com/services/free.html>

2 – PRODUCT BRAND IDENTITY

Last month, we covered the importance of establishing a brand identity for your software product – a unique logo or image that is consistently displayed across all visual elements such as your web site, banner ads, print advertising, your application's icon and "About" window, etc. Repeat viewings of this key imagery will help foster consumer recognition, so on every web page related to your application, include your product logo or signature imagery. The logo placement of CodeQuiver in **Figure 1, Item 2**, is just one of many ways your software can be represented on your site.

3 – PURCHASE AND DOWNLOAD LINKS

While developers are already aware of the necessity of including purchase and download links on their software web pages, it should be noted that the placement of these two items is critical. Newspaper editors refer to the most valuable real estate as the top half of the page above the fold. To see below the fold forces the reader to flip over the newspaper, which requires a second step. The average consumer is too busy to waste time looking for these links. If you place these two links at the bottom of your web page after your product description, you run the risk that the user may not bother to scroll down beyond the initial screen (below the fold). Also, do not bury these two links within your product description. As silly as it may sound, many consumers scan through sites so quickly that they may not see the links unless they are placed at the top of the page with eye-catching buttons or large bolded text. We used to receive a few e-mails every month from visitors looking for a certain download link that was there on our site, but they just could not "see" it. We moved the link to the top of the page and replaced it with a large button, and now we no longer receive those kinds of e-mail queries. If they can't find it, they can't buy it. **Figure 1, Item 3** shows how the download and purchase buttons are prominently displayed on the web page, strategically "framing" the text description in the center.

4 – TEXT VS. GRAPHICS

When it comes to listing the current version number, price, and other key elements, there are two advantages to displaying this information as plain HTML text and not as graphic images. One is that search engine bots only read text when indexing your site, so it's important that they pick up the appropriate keywords in your web page text for higher search rankings. Secondly, HTML text is a lot easier and quicker to update than having to edit and resave an image file. Many developers include the version number next to the product name in the software logo image. Sure it looks stylish, but it takes that much more time to modify the graphic the next time you release a new version. With the frequency that version numbers, prices, and product descriptions change, an effective web site is not only one that best serves your audience, but also one that best serves your busy schedule. Time equals money, so we'd all rather be programming the next killer app and spending less time updating web pages.

5 – PRODUCT DESCRIPTIONS

When was the last time you read a lengthy product description online in its entirety? Reading long paragraphs of text in a web browser is not only hard on the eyes, but it just *feels* tedious. Most people don't take the time to read online. Their eyes dart across the screen, looking for keywords and phrases that can quickly summarize what your software product can do to make their life better. And you're lucky if your web page receives fifteen seconds to convince them of that before they move on to the next link. We live in an age where essays have seemingly been replaced with PowerPoint decks and bulleted lists.

Brevity is key. When it comes to editing your product description for the Web, less is more. Be careful to include all of the necessary keywords to improve your placement in the search engines, while whittling down the description to short paragraphs and bullet points. Emphasize the key features that will attract buyers. Save the minutiae for your documentation and help file.

If your software is a complicated application (such as a development environment) with lots of features that need to be mentioned, it's a good idea to break the different sections of your description into several interlinked pages. This way, consumers get a brief overview from reading the main product page and those who are interested in learning more can click on links to view detailed explanations of features, specifications, etc. This modular, "drill-down" approach provides the information in bite-sized, easy-to-digest servings. A side benefit to splitting long descriptions into multiple, interlinked pages is that there are now more pages that can be indexed by search engine bots for ranking placement. Just be careful to maintain a safe balance between sectioned pages and convenience. In **Figure 1, Item 5**, CodeQuiver's

main description is very brief with related links listed in the right column. Most of those links only go one level deep. While you want your pages to be read, you don't want to create too many sublevels of information, making specific details hard to find.

6 – SCREENSHOTS VS. FEATURES TOUR

First of all, if you don't already include screenshots on your site, then you're missing out on a valuable selling tool. For software with a user interface, people want to see what it looks like. For those who are lazy enough to say that people should just download and try the software if they want to see the interface obviously don't remember that people are lazy enough to walk away rather than take the time to download an unknown application. If someone is seriously interested in your product, they will download the trial version immediately, but many of your site visitors may only be casually browsing. Those are the impulse buyers that you want to hook with enticing screenshots.

Many developers simply post a web page of five or six screenshots with nothing more than one or two word captions like "Main Window" or "Preferences Window." While this does serve the purpose at hand, there is a more effective way to turn mild curiosity into serious interest. In the last section, we discussed the need to keep product descriptions brief and now we see the need to add more descriptive context to screenshots so that consumers truly understand what they are viewing. You can kill two birds with one stone by creating an online "tour" of your application. This concept usually consists of several pages linked in succession with "Previous" and "Next" arrow buttons, so that a consumer can travel effortlessly through the tour, learning more about your product with each new step. In **Figure 1, Item 6**, the "Features Tour" link would take a reader through CodeQuiver's key features such as adding a code snippet to the database, searching by keyword for specific code snippets, showing CodeQuiver's compact interface working side-by-side with Apple's Project Builder, etc. Each page would include one or two screenshots with a paragraph that explains the illustrated feature.

7 – TESTIMONIALS, AWARDS AND REVIEWS

It may feel awkward to brag about your own creations and achievements, but that's one of the job requirements when selling your software. People *want* to know about awards and stellar reviews. They *want* to read comments from their peers. These accolades are important because they establish credibility for your software. Your web site needs to be an effective advertisement for your products, serving as an interactive marketing brochure to help consumers with their buying decision.

If you're shopping for a new text editor and you're trying to decide between the 4-star, award-winning veteran and a cheaper unknown brand, you're probably going to choose the acclaimed,

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popular one. Even though it's more expensive than the others, it's fairly easy to justify the higher price if that text editor is perceived as a higher quality product.

You need to argue that same case with your software products. If your software has received positive reviews and awards, let your site visitors know about them. It can mean the difference between their purchase of your product or your competition's. Did Tucows.com award your product with a 5-cow rating? Did VersionTracker.com users collectively rate your product with a 4.5-star average? Never assume that site visitors are already aware of these accolades.

Figure 1, Item 7 shows an example of a key quote from a leading developer magazine placed prominently on CodeQuiver's web page. If an expert's opinion piques someone's interest enough to read more and even download the trial version, then the "hook" worked.

Make sure your bragging rights are earned and not self-proclaimed. Announcing on your site that your own product is the "best in the world" does not educate consumers – it simply comes off as arrogant. But if a leading magazine awards your product as "best choice" in its category, then that is a badge your site can proudly display.

If your product is brand new and has not yet had the opportunity to garner any acclaim, then posting a dedicated

page for customer testimonials and reviews may be a tad premature. Instead, ask fellow developers to beta test a pre-release of your software. If they have positive feedback, then ask for their permission to post their kind words online. A few solid recommendations quoted on your site can really help sell an otherwise unknown product.

But word to the wise, do not fabricate ratings, awards or testimonials. People are smarter than you think and can usually smell a rat. VersionTracker.com users are very adept at spotting fraudulent feedback, so do not pose as an anonymous VersionTracker member waxing poetic on how cool your own software is and why it deserves 5-stars. If suspected, they will pin you to the mat with flaming feedback postings, accusing you of being an unethical amateur – exactly what we're trying to avoid. We want to attract new customers, not drive them away by the truckloads.

8 – ONLINE SUPPORT

One of the key elements that factor into a consumer's buying decision is the level of support that comes with a software purchase. Consumers look to your web site as an indication of how you support your products. If your online support consists only of a single e-mail link, then you may not be providing the level of comfort that a potential customer is expecting. Telling customers to e-mail support questions to dave@codequiver.com – which is the same e-mail address listed for sales inquiries – makes your company look like a small operation. If consumers suspect that the same person that develops the software is also swamped answering all sales and support e-mails, they may fear that their support question will go unanswered for days. While this may be an unfair perception since many shareware developers successfully run their own one-person businesses and provide better support than most Fortune 500 companies, it is a common misconception that your web site can help alleviate.

For shareware products, consumers generally do not expect toll-free support phone numbers, but they do expect to find online support forms that allow them to submit details of their problems. There are dozens of freeware "form mail" CGI scripts available online that can be implemented to send web-based form data to your e-mail address. Most web hosting providers include a form mail script for their accounts that is already configured to work with their servers. Not only do online forms add a professional polish to your site, but they also prevent spam bots from harvesting a listed e-mail address. Tech support is busy enough as it is answering customer queries without having to wade through an endless sea of spam.

Your software web site should not only help you make money, but it should also help you save money. Tired of receiving support and sales e-mails with common questions that you've answered a million times? Take a moment to add a web

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page for frequently asked questions (FAQ) or a searchable online knowledgebase (see **Figure 1, Item 8**).

Do not rely solely on an Apple Help manual that is accessed from within your software application. If a customer cannot launch your application, then they may not know how to manually find and open its Apple Help files. Instead, they will turn to your web site for assistance. Since Apple Help consists of HTML files, it should be relatively easy to add these pages to the support section of your web site with minimal tweaking.

The extra couple hours it takes to add the additional documentation and support pages will save you countless hours in the future with fewer support e-mails to answer. Not only will the presence of these extra pages instill comfort for those consumers who are evaluating your software and support services, but these web pages will allow your global customers in various time zones to find quick solutions 24 hours a day, 7 days a week – even when you're asleep.

9 – THE ART OF UPSELLING

Some of your best customers will be ones that have already purchased one or more of your products. Reward their loyalty with special upgrade offers (see **Figure 1, Item 9**) and exclusive discounts on new products. Since your satisfied customers are already aware of your development quality, selling them new products does not require as much effort. Be careful not to exploit their loyalty with excessive upgrade fees. These are the people who praise and recommend your software to their friends, family, and co-workers, so they should be appreciated and rewarded accordingly. We'll dive deeper into the art of upselling in a future issue.

10 – E-MAIL NEWSLETTERS

Even though you always post the latest news and release information online, consumers may not remember to revisit your site for new updates. If they're interested in your software, don't throw away the opportunity to continue communicating with them. By offering a free e-mail newsletter service (see **Figure 1, Item 10**), consumers can sign up to receive monthly software news and special offers from you via e-mail. This gives you a very powerful marketing tool for promoting your software directly to anyone who is interested. Since these site visitors voluntarily "opt-in" as newsletter subscribers, you don't have to worry about spam accusations. These subscribers *want* to receive e-mail from you (as long as you don't flood their e-mail box with more than one or two messages a month). A proper e-mail newsletter service provides a "unsubscribe" link at the bottom of every delivered message, so that subscribers always retain the ability to "opt-out" if desired.

So how can you add this cool service to your web site? Some web hosting providers offer list servers as an add-on option – that's one approach. Another common technique is to



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use a web form that saves entries to a flat-file or SQL database. CGI scripts can then be engineered to send a bulk message to the e-mail addresses from that database using the server's mail program. The problem with this approach is it creates a lot of extra work for you as the developer. You may not have to start from scratch as there are a lot of existing scripts available online for Perl, PHP, ASP, etc. Check out ScriptSearch.com and look under the "Mailing List Managers" category. Even if you do find a freeware or shareware set of scripts that suits your needs, you will still have to set-up and configure this web-based system to work with your server.

If that sounds like a royal headache, then there are third-party services that can offer you an automated solution (with many time-saving features) for a minimal fee. Microsoft's bCentral site offers a service called ListBuilder that will manage your newsletter mailing list. Sign up for an account at ListBuilder.com, add a few lines of code to your site, and you've got yourself a full-featured e-mail newsletter service within minutes. You're given a web-based administration panel for customizing your ListBuilder account, sending new messages (as either text or HTML e-mails), and even importing/exporting e-mail addresses. Every newsletter sent through your ListBuilder account includes a convenient "unsubscribe" link at the bottom of the e-mail, automating a task that would otherwise take you hours to develop or manually maintain yourself. Consumers can subscribe and unsubscribe without you having to lift a finger. ListBuilder is not free, but the annual cost may be worth the time it saves you.

11 – TELL-A-FRIEND

We've all seen the various "Tell -a-Friend" or "Email to a Friend" links on various web sites. This "viral" marketing tool is a very powerful grass-roots method of increasing awareness for your software products by enabling your site visitors to "spread the word." And the best part is that once this feature is set-up on your site, you don't have to do a thing – your site visitors are the ones doing all the work! If someone visits the CodeQuiver web page and wants to tell a co-worker about it, that person can easily recommend the site by clicking on the "Email this Page" link (see **Figure 1, Item 11**).

Clicking the "Email this Page" link passes the current web page's URL and document title to the Tell-A-Friend page as parameters. The Tell-A-Friend page then dynamically displays a web form with the parameters stored as HTML form values (see **Figure 3**). The user simply completes and submits the form to send the page recommendation to a friend. This can all be scripted quite easily in either JavaScript, PHP, ASP, etc. with the final form being handled by a CGI form mail script (as discussed earlier in this article). Before you roll up your sleeves and begin coding, check out the "Site Recommendation" category on ScriptSearch.com under your favorite scripting language and you'll find a large collection of existing solutions that you can customize for your own needs.

While this "Tell-A-Friend" component is fairly easy to implement, there are some important factors to consider. Keep the web form brief. Only include the required fields necessary to

get the job done (see the example in **Figure 3**). If the form takes too long to fill out, people won't use it. Also, never record the e-mail addresses that are submitted through the "Tell-A-Friend" script and state this promise on the "Tell-A-Friend" page with a link to your site's Privacy Policy (something that all sites should have in today's world of spam and privacy lawsuits). If visitors are uncertain as to whether e-mail addresses are being recorded or not, they may avoid using the "Tell-A-Friend" feature. The word of mouth achieved will prove to be much more valuable than the e-mail addresses you might be tempted to collect.

Figure 3. Adding a "Tell-A-Friend" feature to your site enables visitors to easily "spread the word" about your software products.

YOUR WEB SITE WORKS FOR YOU

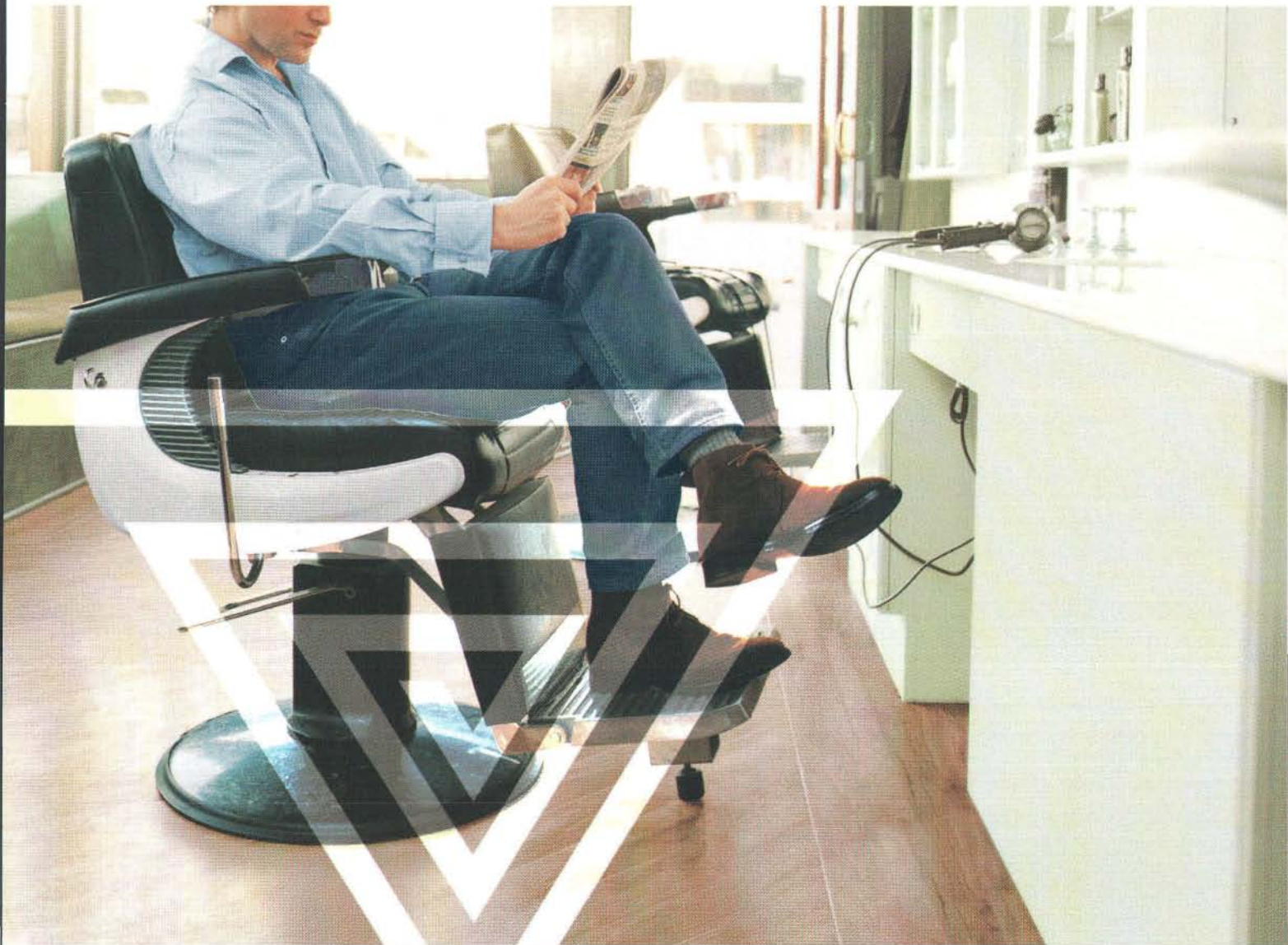
As programmers, we understand how user experience can make or break a sale. This should be a major concern not only when developing your software, but also when designing your web site. It serves as a tireless online sales and support representative, promoting your software and aiding your customers round-the-clock. While the web essentials discussed here are only a handful of possible tools, hopefully you'll find some of these ideas helpful in turning your software company's web site into a marketing machine!



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Andrew Troelsen, Minneapolis, Minnesota

Up and Running with the SSCLI

Exploring .NET development on Mac OS X

LET THERE BE CODE

In the last issue, you were introduced to a number of specifications that qualify the .NET platform, collectively termed the Common Language Infrastructure (CLI). As mentioned, these specs (no matter how detailed) do us little good until they are implemented in a usable code base. In this installment, you will obtain, configure and explore one such implementation of the CLI named the Shared Source CLI (SSCLI). Although the SSCLI originates from Microsoft Corporation, the contained source code is designed to build on Win32, Mac OS X and other FreeBSD-based distributions.

THE ROLE OF THE SHARED SOURCE CLI (SSCLI)

Before we can begin creating our own custom .NET assemblies (see previous issue) our first task is to obtain a viable implementation of the CLI. For the time being we will concentrate on a research-focused distribution provided by Microsoft named the SSCLI (which also is referred to by its code name *Rotor*). The SSCLI is 'research-focused' in that it is not intended to be used to as a production level development platform (though on some levels, it most certainly could be), but rather as a tool to explore the C# programming language and the technologies defined by the CLI itself.

The SSCLI does not ship with an implementation of ADO.NET (.NET's data access API), ASP.NET (.NET's Web development API) or Windows Forms (.NET's GUI desktop API). On the plus side, the SSCLI does supply a fully functional C# compiler, a JScript.NET compiler (which is, in fact, written using C#), a VES implementation and core class libraries (described a bit later in this article). As you would also expect, the SSCLI ships with a number of command line utilities (security tools, compilers, assembly-tweaking tools and so forth) that allow you to interact with the platform itself.

The source code contained within the SSCLI is a blend of C++, C# and assembler instructions (used for only the very lowest of low-level OS-specific details). A majority of the C++ code represents a key aspect of the SSCLI termed the Platform Adaptation Layer (PAL), which abstracts away OS-specific details (more details in just a moment). On a related note, the C++ programming language is used to build the C# compiler. Beyond this however, C# makes up a majority of the source code, which is used to implement a vast majority of the SSCLI base class libraries as well as the JScript.NET compiler.

Rest assured that by taking the time to work with the SSCLI, you will not only gain a solid understanding of the C# programming language, but core aspects of the .NET runtime engine and the programming tools you will make use of on a daily basis. As you would guess, this will provide an excellent foundation when examining other implementations of the CLI such as Portable .NET, Mono and Microsoft's CLR.

Defining 'Shared Source'

The 'SS' in SSCLI refers to the fact that the code base may be extended, modified, hacked, compiled and shared among developers. Thus, if you wish to add additional functionality to the C# compiler, change the way the execution engine handles memory allocations or use the code representing the JScript.NET compiler as the basis for a new .NET language compiler (Logo.NET anyone?), you may do so! However, what you may *not* do is redistribute a modified SSCLI code base for monetary profit (after all, *shared source* is not quite *open source*).

Throughout this series, it is my assumption is that most of you are more interested in using the SSCLI as a vehicle to understand the .NET platform and C# language rather than to alter the existing code base. Given this, I do not intend to spend too much time drilling into the low-level SSCLI implementation code, unless it provides insights into the discussion at hand (whatever that may be). However if you do intend to tweak and recompile the SSCLI source code files, *be sure to read* the (one-page) license agreement (license.txt) located under the root /sscli folder. Here you will find more details regarding the shared source mindset.

Andrew Troelsen is a seasoned .NET developer who has authored numerous books on the topic, including the award winning *C# and the .NET Platform*. He is employed as a full-time .NET trainer and consultant for Intertech Learning (www.intertechlearning.com) and spends his idle moments at home playing far too many video games. You can contact Andrew at atroelsen@mac.com.

YOUR FRIEND, THE PAL

As mentioned, a major chunk of C++ source code represents the Platform Adaptation Layer, or PAL. The role of the PAL is to emulate a subset of the Win32 APIs for use on diverse operating systems. The operative word in that last sentence is *subset*. Basically, the PAL is a platform neutral API which exposes core services such as file IO, networking services, error handling, threading and so forth. The trick however is that although the names of these functions map directly to Win32 APIs, their implementation will differ wildly based on the underlying target operating system.

The next point to be made regarding the PAL is the fact that the /sscli/pal folder contains two subdirectories: unix and win32. As you would guess, if the SSCLI were built on a Win32-based machine, the code within the win32 folder is used to build the PAL. Under Unix-based systems (which of course includes Mac OS X's Darwin), the unix folder is consulted during the compilation process. In either case, it is worth mentioning that not all of the functions defined by the PAL have an exact match in the Win32 API. To be sure, there are a small number of functions (all of which have the 'PAL_' prefix), which are particular to the SSCLI itself.

Again, if you don't intend to modify the SSCLI or port the code base to a new operating system, you can basically be blissfully unaware of the gory details regarding the Platform Adaptation Layer. However, if you wish to take a detailed look at the functions defined by the PAL, you can read the "PAL guide" which is documented in /sscli/docs/techinfo/pal_guide.html. If you wish to view the exact C++ header file that prototypes each function (and the related C++ structures, enumerations and typedefs), examine the rotor_pal.h file located under the /sscli/pal folder.

DOWNLOADING THE SSCLI

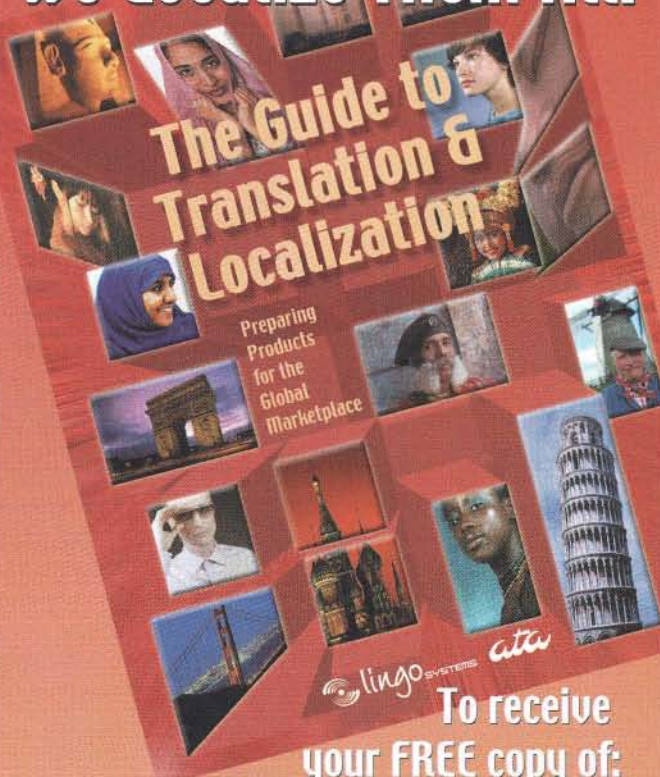
To obtain the SSCLI, launch your Web browser of choice (Safari, of course) and navigate to <http://msdn.microsoft.com/net/sscli>. Scroll down to the end of this page and download the files listed in **Table 1** to your folder of choice. Be very aware that the SSCLI will *not* build if the local directory path contains any spaces. Therefore a subfolder in your Developer folder named "My_DotNet_Stuff" is fine, while "My Dot Net Stuff" is quite problematic as far as the build process is concerned (this is true of Unix builds in general).

File to Download	Meaning In Life
sscli_20021101.tgz	This file contains the code needed to build a working implementation of the CLI, including C# and JScript.NET compilers.
sscli_ref_20021101.tgz	This file extracts to an HTML based class library browser that documents all of the types supplied by the SSCLI.

Table 1. *The file of the SSCLI*

As you will surly notice, the size of these files are quite large. Again, given that the SSCLI is a research-focused implementation of the CLI, you will be downloading a huge

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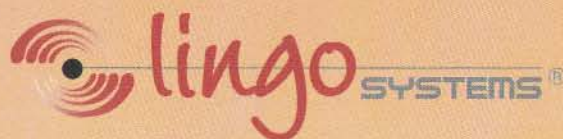
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amount of raw source code. Later in this series when we shift away from the SSCLI to a 'real-world' implementation of the CLI (such as Portable .NET) you will be pleased to find more manageable downloads.

OBTAINING AND INSTALLING Tcl/Tk

Before you unpack and build the SSCLI, you will also want to make sure that your Macintosh development machine is equipped with Tcl/Tk. First two questions: "What is Tcl/Tk and why do I need it?" Tcl/Tk is a GUI toolkit and scripting language that can be used to build traditional desktop applications. As mentioned, the SSCLI does not ship with an implementation of Windows Forms, however several sample applications make use of the Tk 8.4.0 widget set to illustrate how the SSCLI can be extended to support alternative GUI toolkits. Therefore, if you wish to run the supplied Tcl/Tk samples (which we will do at a later time), you will need to install this Unix package.

Next question: "Where do I obtain Tcl/Tk?" www.scriptics.com is the official web site for Tcl/Tk, and from here you can download the latest binaries. If you prefer a Mac-friendly alternative however, you can make use of Fink (and/or Fink Commander) to download and install Tcl/Tk with minimal fuss and bother.

This leads me to address the final possible question you might have at this point: "What is Fink?" (if you already know the answer, feel free to begin your download now). Given that the Mac OS is a Unix-based operating system, the Fink project was created to provide a simple way to install Unix software on the Macintosh. While Fink is a command line driven tool, the complementary Fink Commander application provides a GUI shell to the same functionality (both can be downloaded from <http://fink.sourceforge.net>). Assuming you have Fink Commander up and running, simply do a search for Tcl (Figure 1) and install the tcltk binary using the Binary | Install menu option.

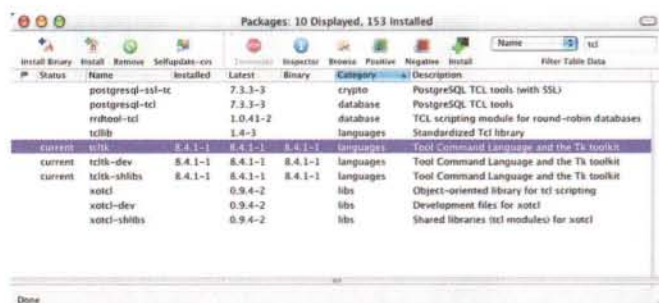


Figure 1. Obtaining Tcl/Tk via Fink Commander

Once you have installed this package, you will find libtcl8.4.dylib and libtk8.4.dylib libraries have been installed (by default) under your /sw/lib folder.

BUILDING THE SSCLI

Due to the fact that you are reading MacTech, you are no doubt a software developer (hobbyist or otherwise), and given this fact, I'd bet you have latest and greatest Mac OS

programming environment. Nevertheless, do know that the SSCLI expects the following minimal software/hardware requirements:

- Mac OS X version 10.2 or higher.
- The Apple Developer Tools.
- The BSD subsystem installed (this is done by default when installing OS X).
- 256 MB memory at minimum, 512 MB (recommended), 1 GB (the best!).
- One gigabyte of free disk space (remember...this is a research distribution).

Building the SSCLI is very straightforward and only involves interacting with two files: env.csh and buildall. Env.csh is a Unix-based shell script that defines a number of platform-specific environment variables required by the SSCLI. The buildall file, as you would expect, is a script that drives the build process for each of the contained subdirectories. This being said, perform the following steps to build the SSCLI on your development machine:

- Extract sscli_20021101.tgz (either StuffIt or the gnutar utility will do).
- Open a Terminal and navigate to the sscli directory.
- Source the env.csh file at the command line (e.g., type: source env.csh).
- Finally, build the SSCLI by typing ./buildall (within the same Terminal session).

At this point, the build process begins and will continue for some time (now would be a good time to catch up on your e-mails or other such ToDos). If you are interested in examining further details of the build process, check out the building_sscli.html, env.html and buildall.html documents located under sscli/docs/buildtools/. In any case, once the build process is complete, your Macintosh development machine is ready to plunge into the .NET universe.

LEARNING THE LAY OF THE LAND

Next up, let's take a moment to examine the generated directory structure. Using the Finder, open up the root directory of your SSCLI installation. To be sure, the installation process generates an elaborate directory structure, however Table 2 describes some of the key folders to be mindful of.

SSCLI Subfolder	Meaning In Life
/build/v1.ppcfstchk.rotor	This is the root folder that contains the compiled tools and various SSCLI class libraries.
/build/v1.ppcfstchk.rotor/assembly/GAC	The location of the Global

Assembly Cache (GAC) that contains a number of 'shared' assemblies. As seen in a later article, a single copy of a shared assembly can be consumed by multiple .NET client applications.	
/build/v1.ppcfstchk.rotor/config	Contains various XML-based SSCLI configuration files.
/clr/src/bcl/system	Contains the C# source code files for the base class libraries.
/clr/src/csharp	Contains the C++ source code for the C# compiler (csc), CIL compiler (ilasm) and CIL disassembler (ildasm). The fusion subfolder contains code that allows the SSCLI to bind to specific version of a .NET assembly (more details later).
/clr/src/ilasm	
/clr/src/ildasm	
/clr/src/fusion	
/docs	You guessed it, here are a number of HTML based documentation files for the C# compiler, SSCLI development tools and the underlying infrastructure. The index.html file (located in /docs) is the 'home page' for all other documentation.
/jsript	C# source code for the JScript.NET compiler.
/pal	C++ source code for the Platform Adaptation Layer (PAL).
/samples	Various sample programs to build, modify and execute within the SSCLI.
/tests	Numerous source code files that can be used to test a modified SSCLI distribution.
/tools	These are tools used during the build process of the SSCLI, not tools for building SSCLI applications!

Table 2. A partial listing of /sscli subdirectories

A few pages ago, you were introduced to the role of the /pal folder. I would also like to encourage you to check out the /samples folder. Here you will find numerous C# sample applications that illustrate programming with the SSCLI base class libraries (/sscli/samples/samples_index.html provides details regarding each sample application).

The next folder to be aware of at this point is the all-important /docs folder and the index.htm file it contains. When you open this file, you will find an exhaustive list of all of the documentation files for this CLI distribution. I highly

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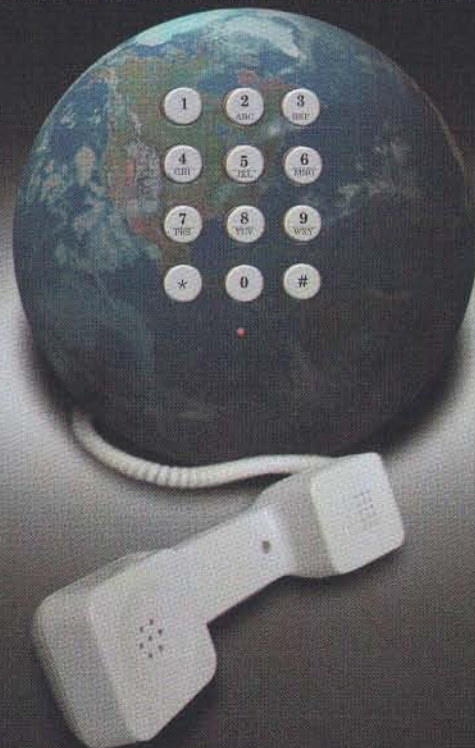
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recommend you save this file to your browser's Favorites list, as you will come here time and time again to learn about the tools, samples and technologies provided by the SSCLI.

INSTALLING THE SSCLI ONLINE DOCUMENTATION

The next configuration task is to extract the SSCLI online help contained within `sscli_ref_20021101.tgz`. Once you have extracted this binary (again, either StuffIt or gnutar will do), you will find a file named `ClassLibrary.html` within the root directory. As you would guess, this file contains links to each of the namespaces of the SSCLI, the highlights of which can be seen in **Table 3**.

Navigating the HTML-based help system is simple. To take things out for a test drive, click on the `System.Xml` link located towards the bottom of `ClassLibrary.html`. Once you do, you will find a 'home page' for the selected namespace, followed by a list of each *type* it contains (recall from the previous issue, the term 'type' is a generic way to describe classes, interfaces, enumerations, structures and delegates). Next, click on the `XmlTextReader` class type link. As you can see (**Figure 2**) you are provided with a C# definition and description of the type as well as the set of members it supports.

SSCLI Namespace	Meaning In Life
System.CodeDom.Compiler	'Code DOM' is a very interesting technology which allows you to represent .NET coding constructs in language neutral terms, and dynamically generate and compile the persisted source code.
System.CodeDom	
System.Collections.Specialized	The collection-centric namespaces provide numerous types (ArrayList, Hashtable, etc) that allow you to manage other types.
System.Collections	
System.ComponentModel	This namespace defines types that allow you to establish how your custom <i>components</i> should be treated at runtime (and possibly at design time).
System.Configuration.Assemblies	As you will see later, .NET assemblies can be configured using XML-based configuration files. These namespaces define types that allow you to interact with these files programmatically.
System.Configuration	
System.Diagnostics.SymbolStore	These are fairly low-level namespaces that define types that allow you to programmatically interact with debugging and tracing details.
System.Diagnostics	
System.Globalization	Here you will find types that help you deal with issues of internationalization.
System.IO.IsolatedStorage	As you would guess, the System.IO-centric namespaces allow you to interact with your machine's directory structure.
System.IO	
System.Net.Sockets	Namespaces that allow you to program against various network protocols.
System.Net	
System.Reflection.Emit	The reflection namespaces allow you to dynamically investigate, and generate, types at runtime.
System.Reflection	
System.Resources	Contains types which allow you to embed resources (such as string literals) into a given .NET assembly.
System.Runtime.CompilerServices	You will never care about this namespace unless you are interested in building a .NET-aware compiler.
System.Runtime.InteropServices.Expando	Interoperability is the term used to describe the process of communicating with native libraries from within a .NET code base. These namespaces provide types for such a task.
System.Runtime.InteropServices	
System.Runtime.Remoting.Activation	The SSCLI provides numerous namespaces that allow you to build distributed systems using the .NET remoting architecture.
System.Runtime.Remoting.Channels.http	
System.Runtime.Remoting.Channels.Tcp	
System.Runtime.Remoting.Channels	
System.Runtime.Remoting.Contexts	
System.Runtime.Remoting.Lifetime	
System.Runtime.Remoting.Messaging	
System.Runtime.Remoting.Metadata.W3cXsd2001	
System.Runtime.Remoting.Metadata	
System.Runtime.Remoting.MetadataServices	
System.Runtime.Remoting.Proxies	
System.Runtime.Remoting.Services	
System.Runtime.Remoting	
System.Runtime.Serialization.Formatters.Binary	
System.Runtime.Serialization.Formatters.Soap	
System.Runtime.Serialization.Formatters	
System.Security.Permissions	As you would guess, these namespaces provide types that allow you to interact with the .NET security model.
System.Security.Policy	
System.Security.Principal	
System.Security	
System.Text.RegularExpressions	Regular expressions manipulation namespaces also ship with the SSCLI.
System.Text	
System.Threading	The System.Threading namespace defines types that allow you to create and manipulate multi-threaded applications.
System	
System.Xml.Schema	The SSCLI supplies a number of namespaces that allow you to generate, read and manipulate XML-based data.
System.Xml.Serialization	
System.Xml	
System.Xml.XPath	
System.Xml.Xsl	

Table 3. The SSCLI Base Class Libraries

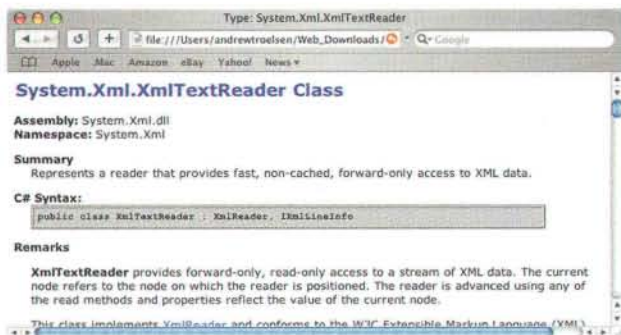


Figure 2. Reading up on the XmlTextReader type.

I would also greatly encourage you to add the ClassLibrary.html link to your browser's Favorites list. Over the lifetime of this series, I am assuming you will dive in and check out details I do not have the space to directly cover on your own accord.

SETTING YOUR A DEVELOPMENT ENVIRONMENT

At this point I'm sure you are ready to build .NET applications using the SSCLI, however I have two final configuration settings, which while not required, will no doubt make your programming time more productive. The first tip is to define a set of shell aliases that allow you to quickly enable the SSCLI development environment (Listing 1). Using your text editor of choice, update your .tcshrc file with the following:

Listing 1. Defining shell aliases

```
# Change to SSCLI directory.
alias GoSscli 'cd ~/Web_Downloads/CLI/sscli'

# Change to SSCLI and source the env.csh file
alias DoSscli 'GoSscli; source env.csh'
```

The first alias, GoSscli, can be typed into a Macintosh Terminal to quickly navigate to the directory containing the SSCLI (of course, *your path may vary*, so modify accordingly). The second alias, DoSscli, leverages the first alias to change to the SSCLI directory and sources the env.csh file to establish the necessary environment variables. To be sure, when you intend to interact with any of the SSCLI command line tools (including the C# compiler) you must source this script or else contend with the dreaded "command not found" error.

To test your shell updates, close your current Terminal to commit the changes, open a new Terminal and execute the DoSscli command. You should see something like the following (Listing 2):

Listing 2: The result of commanding DoSscli

```
Last login: Thu Oct 9 14:32:48 on ttty1
Welcome to Darwin!
[Andrew-Troelsens-Computer:~]andrewtroelsen% DoSscli
Fastchecked Environment
```

Now, type in the following command to see the list of options of the C# compiler:

```
csc -help
```



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If all is well, you should find output similar to that of **Figure 3**.

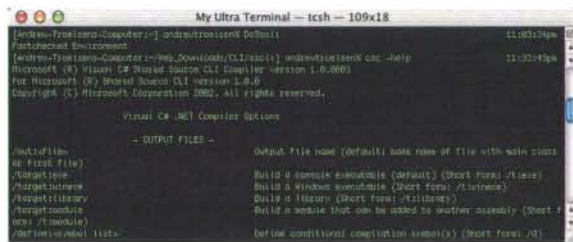


Figure 3. Options of the C# Compiler

Configuring Project Builder

The final shortcut you will most likely wish to do is to enable Project Builder to edit C# code files. This one is a no-brainer, simply create a new file with a *.cs file extension (or locate one of the existing files provided by the SSCLI) and double click on the icon. From the resulting dialog box, simply choose Project Builder as the default application.

You will notice that Project Builder seems to recognize the syntax of C#, however don't get your hopes up. While code comments and string literals are realized, C#-specific keywords (such as 'namespace', 'using' or 'unsafe') do not receive such color-coding. Nevertheless, using Project Builder to edit C# code is an appealing alternative to command line editors such as vi or pico (at least in my opinion!)

THE BASIC FLOW OF SSCLI DEVELOPMENT

Excellent! If you are still with me, you are now all set to build your first .NET application using the C# programming language. Regardless of which aspect of the SSCLI you are exploring or which type of application you are constructing, you will tend to follow a fixed set of tasks:

- Ensure you are working within a Terminal that has the SSCLI environment variables activated (thus the reason for the DoSscli alias).
- Send your C# source code (as well as any number of command line arguments) into the C# compiler, csc.
- Run your executable application using the Common Language Infrastructure Execution tool, clx.

Let's close this article with a complete example.

BUILDING YOUR FIRST .NET APPLICATION

Our goal in this section is to create a code library (myLib.dll) that is consumed by a client application named myClient.exe. As briefly noted in the previous issue, .NET assemblies which end in a *.dll extension cannot be directly loaded by the runtime, but are rather loaded on demand by the client executable which request their services (you'll see many more details regarding .NET binaries and C# later in the series, so don't sweat the details).

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Creating MyLib.dll

To begin, create a file named `myLib.cs` and author the following C# namespace definition (**Listing 3**):

Listing 3: Your C#-based .NET code library.

```
using System;

namespace MyLibrary
{
    public class PlatformInfo
    {
        // Static methods can be called
        // directly at the class level.
        public static void PrintEnvInfo()
        {
            // Use System.Environment to show some stats.
            string info =
                string.Format("\n.NET version is: {0}.",
                    Environment.Version);
            info +=
                string.Format("\nSystem Directory is: {0}.",
                    Environment.SystemDirectory);
            info += string.Format
                ("\nMilliseconds since last boot: {0}.",
                    Environment.TickCount);
            Console.WriteLine("**Your System Information*");
            Console.WriteLine(info);
        }
    }

    public class MyMathClass
    {
        // Non-static members must be called at the
        // object level.
        public int AddNumbers(int x, int y)
        {return x + y;}
        public int SubNumbers(int x, int y)
        {return x - y;}
        public int MultiNumbers(int x, int y)
        {return x * y;}
        public int DivideNumbers(int x, int y)
        {return x / y;}
        public string WhichIsBigger(int x, int y)
        {
            return string.Format("{0} is bigger!",
                Math.Max(x, y));
        }
    }
}
```

Surprisingly, this trivial namespace definition illustrates a number of aspects of the C# language. First, recall from the previous article that the C# `namespace` keyword defines a conceptual boundary for a set of related types, while the `using` keyword allows you to access types contained within another namespace. Here, the `MyLibrary` namespace defines two class types (in contrast to Java, a single C# source code file may define any number of types, whose names do not need to map to the name of the physical source code file).

The public `PlatformInfo` class defines a single static method named `PrintEnvInfo()`. As you most likely already know, static type members can be called directly from the class level without the need to manually create an object in memory. The implementation of this method makes use of the static `string.Format()` method to build a string containing various bits of information regarding the current development machine. Recall from the previous installment of this series that the curly bracket syntax (e.g. `{0}`) signifies a placeholder for dynamic string building (slightly akin to the C `printf()` function).

The `MyMathClass` defines a set of instance level methods that manipulate two integer parameter types. As

detailed in a future issue, the C# programming language defines a number of keywords which are shorthand notations for true blue types in the `System` namespace. Here, the C# `'int'` keyword represents a `System.Int32` structure type. Next notice that the `WhichIsBigger()` method leverages the static `Math.Max()` method to return a stylized string. Finally, in the case of each class implementation, notice that C# honors the C, C++, Objective C and Java style escape characters such as `'\n'`.

Now, at the command line, compile this file into a .NET class library as so (**Listing 4**):

Listing 4: Compiling a C#-based code library

```
csc /t:library mylib.cs
```

Here, we are instructing the C# compiler to generate a class library `*.dll` file (via `/t:library`) given an input file named `mylib.cs`. By default, the name of the `*.dll` is based on the name of the first input file, thus upon successful compilation, you should have a new .NET assembly named `myLib.dll`.

Creating myClient.exe

Now that we have a .NET `*.dll` file, we need to create a client application to make use of it. Given this, create another C# source code file named `MyClient.cs` which contains the following namespace definition (**Listing 5**):

Listing 5: The C#-based .NET client application.

```
using System;
using MyLibrary;

namespace MyClientApp
{
    public class MyApp
    {
        public static void Main()
        {
            // First show Environment info.
            PlatformInfo.PrintEnvInfo();

            // Make a MyMathClass type.
            MyMathClass m = new MyMathClass();
            Console.WriteLine("** Fun with Numbers **");

            // Now enter a loop to perform
            // simple math.
            do
            {
                int x = 0, y = 0;
                Console.WriteLine("Enter two numbers:");
                Console.Write("Number 1: ");
                x = int.Parse(Console.ReadLine());
                Console.Write("Number 2: ");
                y = int.Parse(Console.ReadLine());
                Console.WriteLine(m.WhichIsBigger(x, y));
                Console.WriteLine("{0} + {1} = {2}",
                    x, y, m.AddNumbers(x, y));
                Console.WriteLine("{0} - {1} = {2}",
                    x, y, m.SubNumbers(x, y));
                Console.WriteLine("{0} * {1} = {2}",
                    x, y, m.MultiNumbers(x, y));
                Console.WriteLine("{0} / {1} = {2}",
                    x, y, m.DivideNumbers(x, y));
                Console.Write("Another round? ");
            }while("n" != Console.ReadLine());
        }
    }
}
```

Again, this simple example proves enlightening. First, given that the client application needs to make use of types located in

the System and MyLibrary namespaces, the first lines of code should be clear.

The definition of Main() is important, in that Main() *must* be static and must have a capital 'M' (as C# is case sensitive). Beyond these restrictions however, the Main() method is quite flexible in that it may (or may not) take an array of strings to represent command line arguments, may (or may not) return an integer to the system, and may be declared public or private. Thus, any of the following Main() methods are a-okay (**Listing 6**):

Listing 6: The various faces of Main().

```
public void Main(string[] args) {...}
public void Main() {...}
public int Main() {...}
public int Main(string[] args) {...}
private void Main(string[] args) {...}
private void Main() {...}
private int Main() {...}
private int Main(string[] args) {...}
```

Here, our Main() method simply invokes the static PlatformInfo.PrintEnvInfo() method and allocates an instance of the MyMathClass type via the C# new keyword. After this point, a do/while loop is entered to prompt the user for two numbers to pass to the various methods of MyMathClass.

Last but not least, notice how the textual data retrieved from System.Console.ReadLine() is transformed into a 'real' numerical value using the static Parse() method of the System.Int32

structure as seen in **Listing 7** (remember! The C# 'int' keyword is nothing more than a shorthand notation for declaring a System.Int32 type):

Listing 7: The C# 'int' and System.Int32 relationship.

```
// 'x' and 'y' are really of type System.Int32!
int x = 0, y = 0;
Console.WriteLine("Enter two numbers:");
Console.Write("Number 1: ");
// System.Int32 defines a static Parse() method.
x = int.Parse(Console.ReadLine());
Console.Write("Number 2: ");
y = int.Parse(Console.ReadLine());
```

To compile this file into an executable binary requires the following command set (**Listing 8**):

Listing 8: Building a .C#-based executable.

```
csc /t:exe /r:myLib.dll MyClient.cs
```

Here, we are instructing the C# compiler to generate an executable file (via /t:exe) which references types contained within myLib.dll (via /r:myLib.dll) given the input file named MyClient.cs.

OBSERVING THE FRUITS OF YOUR LABOR

Unlike a native Macintosh application, you cannot simply double click on MyClient.exe to launch the client binary. When working within the confines of the SSCLI, you need to bootstrap .NET executable assemblies using the CLI Execution utility (clix.exe) as seen in **Listing 9**:

Listing 9: All good things do come.

```
clix myclient
```

Once you have done so, you can manipulate integers to your hearts content (**Figure 4**).



Figure 4. Your first .NET Application

WRAP UP

So then! At this point you (hopefully) have succeeded in your installation of the SSCLI and the first compilation of your .NET lifestyle. Over the course of this issue, you have been provided with an overview of various subfolders within the /sscli root directory, the use of the HTML-based help system and select command line tools. In the next issue, you will come to know the details of the C# compiler, investigate several of the supplied sample applications and forge ahead with your understanding of C#. Until next month, happy hacking!



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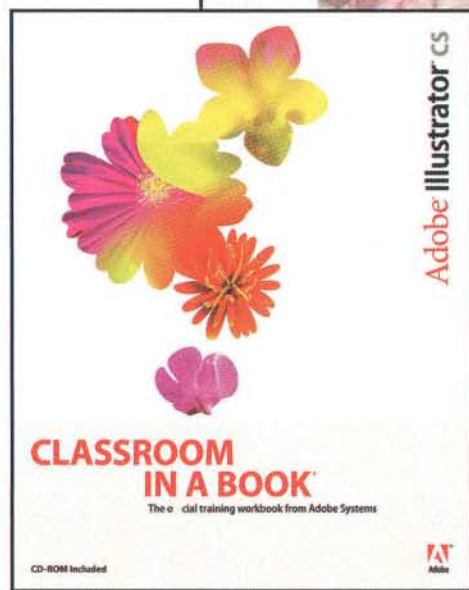
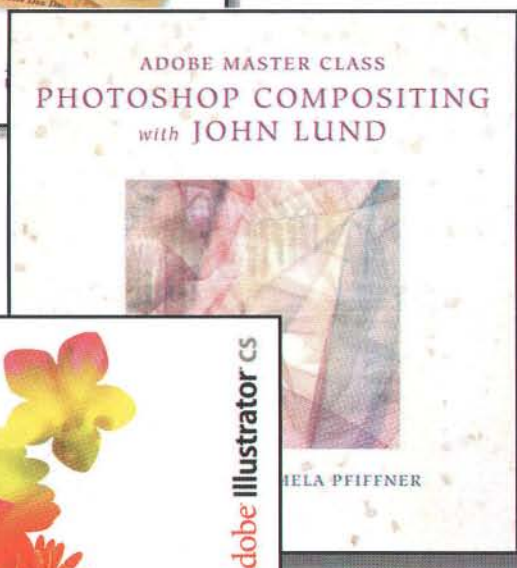
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Peachpit Press

By Chris Kilbourn

VisualRoute

Java tool for graphically displaying traceroute information

DESCRIPTION

VisualRoute 7.1 is a Java application that provides graphical traceroute, real-time latency, and ping data graphed in a tabular and world map format. It also provides limited whois and nslookup features that are available when drilling down on any displayed data. VisualRoute also may be operated via a Java and JavaScript-enabled browser, as it includes its own built-in web server, allowing you to query the application from across the network.

Included in the VisualRoute application is an extensive database of IP address and geographic information that allows it to display traceroutes on the global map. VisualRoute also suggests possible causes for common connectivity issues, which may be helpful when diagnosing network issues.

Users unfamiliar with the command-line use of traceroute, ping, mtr, whois or nslookup will probably get the most mileage out of VisualRoute. It provides a GUI-driven interface for these commands without having to read the man pages. Network and system administrators who need to explain why, "the Internet is down" to users unfamiliar with Internet routing and topology will appreciate the map that you can point to and say, "The problem is there, not here."

FIRST BLUSH

Installation is straightforward from a Stuffit Archive to a standard package installer, except for a minor glitch that I had which required me to upgrade to Stuffit 7.0.3 from the 7.0 version I was running. As far as I could tell, the only files installed are the VisualRoute application itself, two html files and a gif. The system I tested the product on was a 667mhz TiBook with 768MB of RAM running Mac OS X 10.2.6.

Upon first launch of the program asks you to select the language you wish to use. Language choices are English, French, German, Spanish, Italian, Swedish, Portuguese, Czech and Dutch.

VisualRoute starts in Simple Mode, and you are presented with a world map and an Address field where you can type in a

host address, (i.e. - www.forest.net,) or an IP address to begin a traceroute. Advanced mode provides a tabular readout of traceroute data along with the world map. I found that while the map was nice eye candy, I tended to work with the tabular information more than the map information. VisualRoute does provide options to display information in ASCII format in a text editor.

One of the first things that struck me when using the application was the lack of keyboard commands for menu items. This likely has to do with the fact that the entire application is written in Java, but it was odd, and was a persistent irritation when driving the program. System-level window controls were still available via key commands.

TRACEROUTE

The core of the application is its traceroute function. Typing in a hostname or an IP address, it begins to collect and display a variety of data about the network between your machine and the destination host.

For those unfamiliar with it, traceroute is a low-level network diagnostic tool that utilizes ICMP (Internet Control Message Protocol) packets. ICMP is used for error control, test packets, packet redirection and other informational messages about network transport of IP. Since ICMP has the potential to provide a variety of information about remote networks by sending off an ICMP packet and waiting for a response, as well as be used in certain network attacks, more and more Internet networks are beginning to filter ICMP packets on the edges of their networks.

Traceroute literally traces the network path, hop by hop, from your computer to a remote host. It provides the IP address of each hop, the node name, and the time in milliseconds from that node to yours. Running a traceroute allows you to discover three critical pieces of information about the network path: how many hops it is from your computer to the destination, if there is congestion at any of the hops, and if there is any packet loss along the way (The terms hop, node, and router may be used interchangeably).

The more hops in a network path, the longer the transfer times will be, in general. Each time a packet has to be processed by a router, it adds a small delay to the transfer. Hop counts from

two to roughly sixteen are considered average. Traceroute displays each hop on a numbered line, so calculating hop count is very easy.

Congestion manifests itself in traceroute by a hop that has a high time value, usually considered to be above 250 milliseconds. Hops with time values of above 250 milliseconds generally mean that the router in question is very busy and queueing packets for processing, adding network latency to that hop.

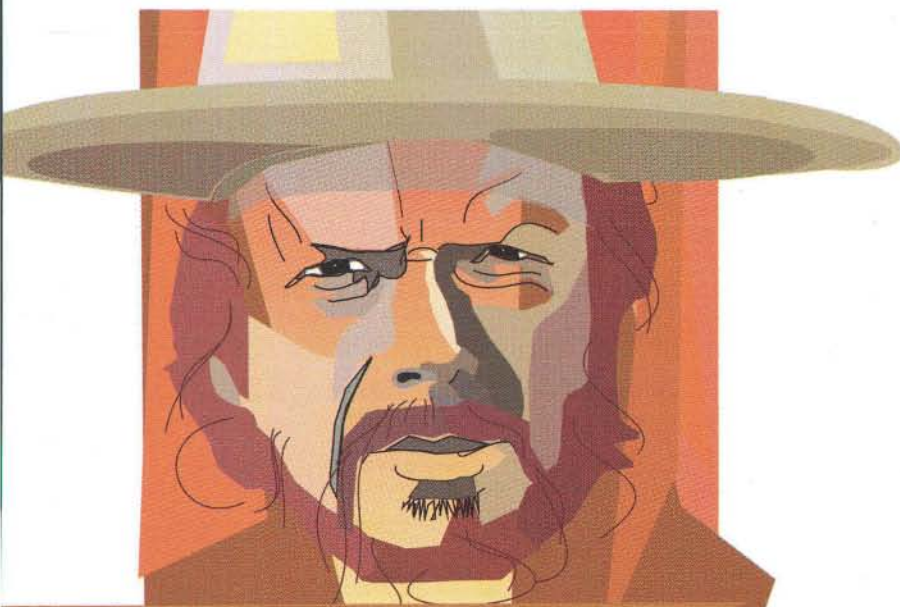
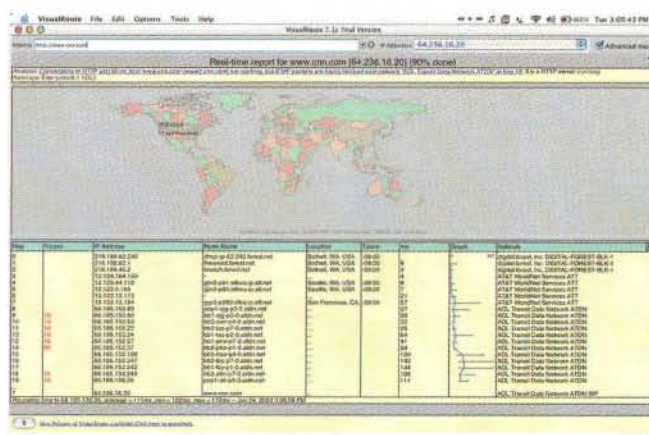
Packet loss in traditional command-line traceroute is displayed with stars (sometimes referred to as 'starring out.') This means that ICMP packets sent to that node are not being returned. When this happens but you can still reach the ultimate destination, it usually means that the router in question is so overburdened that its queue is full, and it is dropping or rejecting new packets for processing. If the traceroute ends before the destination, it usually indicates that the network path has been severed. This could be due to any number of man-made or natural disasters such as power outage, fiber cut, router misconfiguration or the bane of network administrators the world over: telco incompetence.

VisualRoute provides information in its traceroute display in addition to the traditional hop count, IP address, host name and response time. For your viewing and information pleasure, it provides a packet loss percentage, its best guess at the location of a node, the time zone that node resides in, a time graph with current time plotted against minimum and maximum time values, and VisualRoute's best guess as to the network ownership of each hop.

End-user consumer networks, AOL, Earthlink, cable modem providers and DSL providers often filter ICMP traffic. Many corporate firewalls are also programmed to refuse to pass ICMP traffic. Since traceroute and ping require ICMP to flow, if your network provider filters ICMP, VisualRoute will be of little use in providing much traceroute information unless you can run the application from an unfiltered network connection.

USING VISUALROUTE'S TRACEROUTE

Using VisualRoute is simple. You type in a hostname or IP address, hit return, and it automatically begins to map the traceroute on the world map, and build a standard traceroute table with current packet loss and transmission time statistics.



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VisualRoute keeps track of previously traced destinations from a handy pop-up menu and allows you to sort the list by name or most recently visited. It also provides the IP addresses of the hosts to the side in a pop-up menu.

One of the things I enjoyed about VisualRoute's traceroute is its analysis and summary information of the destination host. Above the world map, VisualRoute informs you what type of server the host is and what software it is running. This feature can be very helpful when tracking down web compatibility issues between browser and host or to see if your own servers are publishing OS information they should not be.

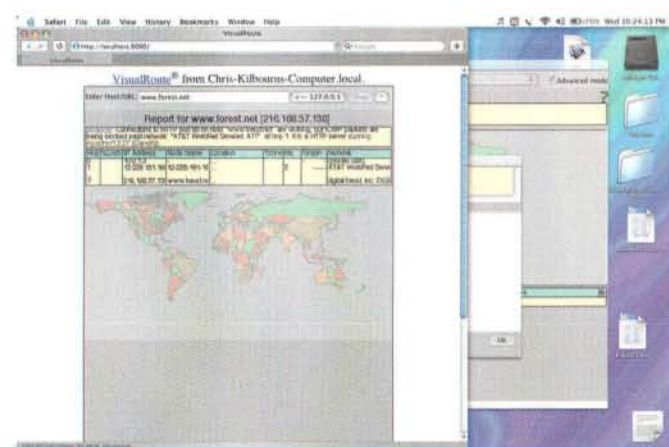
The application will also provide you with suggested connectivity issues if it encounters a problem during a traceroute. These messages will help you determine issues from ICMP traffic being filtered somewhere along the traceroute path to DNS misconfiguration issues.

Double-clicking on a host from the traceroute pane will launch a floating window with IP address information pulled from ARIN, RIPE or APNIC's, (the registration authorities that delegate IP addresses for the Western Hemisphere, Europe/Africa and Asia, respectively,) IP registry databases.

Any information provided that is located in other registries, (registered host addresses, contact handles, etc.) is hyperlinked to allow you to continue to drill down in registry databases. This is an incredibly useful feature that allows you to follow the trail of authority for an address range or host when trying to track down a network administrator to tell them to patch their servers or when hunting for spammer networks to block.

These floating information windows also provide a button to automatically copy information into a text document, which can then be easily cut and pasted elsewhere.

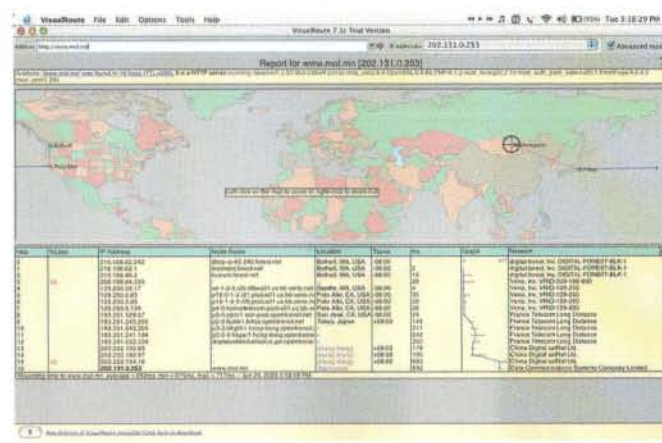
A nifty feature of VisualRoute is its ability to function as a stand-alone web server to provide traceroute information. This is especially helpful if your network filters ICMP and has a DMZ network between the Internet and your internal network.



All the features of the stand-alone server are available via the web interface. Using VisualRoute in the web server mode is a great way to enable users on your network to perform their own traceroutes.

YOU CAN'T GET THERE FROM HERE

In my opinion, one of VisualRoute's most touted features, its database and map of Internet host addresses, is also a subtle Achilles heel. Let's examine a traceroute to a Mongolian web server as an example:



If a user, client or pointy-haired boss of mine was complaining about access times to this server, I would show them the map and the traceroute output times and tell them that it takes a long time to get packets back and forth from inner Mongolia. The complainer thus pacified, I would then turn to more pressing matters like reading Slashdot.

However, taking a close look at and comparing VisualRoute's map versus a relief map of Mongolia indicates that VisualRoute thinks that this server is in the middle of a high desert. I sincerely doubt that server is where it is mapped. We all know that data center operators fight a constant battle with heat, but placing servers in such a low-humidity environment introduces other issues best left for another article. In short, the server is probably in Hong Kong or maybe Ulan Bator based on round-trip times.

Before someone cries, "Foul!" that the example is extreme, and that VisualRoute should be excused from a detailed mapping of Mongolian hosts, (a debatable point either way), allow me to explain why I chose this example and the ramifications of relying solely on single-sourced data for host location information.

One of the greatest things about the Internet is its resiliency in utilizing distributed services. This distribution of services is built in at the protocol level and is a core feature. Current (and some past,) routing technology has the ability to tunnel, VPN, route or otherwise allow for distribution of IP addresses in non-contiguous blocks on widely geographically separated networks.

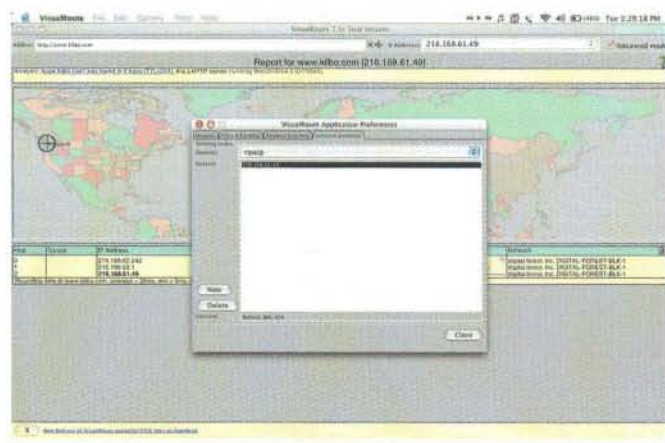
When ARIN, RIPE or APNIC assign IP address space to organizations, they place no restrictions on where in the world those IP addresses may be used. Only the requesting organization's mailing address must be located in the region for which IP address space is requested.

A great example is an employee traveling on international business who remotely connects to the corporate network via a dial-in server and is assigned an IP address via DHCP. Performing a traceroute to their laptop may show increased round trip times due to the distances involved, and the IP address being used is traced back to the corporate headquarters address as listed in the IP registry database.

VisualRoute, or any other program for that matter, would map this dial-in laptop user as at the corporate location, even though they could be anywhere in the world. Examining all available IP address and network information, you have no way to discern if that host is at corporate headquarters or somewhere on the road. The only way to be sure would be to call the user and ask them where they are.

As you can see, you cannot rely 100% upon the geographic host information provided in databases and derived from analyzing IP packets. When examining VisualRoute's traceroute maps, you should be aware of this issue, and take location information for hosts that you do not know about with a small to large grain of salt depending on your need for accurate host location information.

VisualRoute does have an extensive geographic database, and it allows you to add or correct network and host information.



WHY CROSS-PLATFORM CAN BE A FOUR LETTER WORD

VisualRoute is a Java application and as with other cross-platform Java applications on the Macintosh, it shows. My two big beefs are that it ignores human user interface guidelines by forcing the user to go to the mouse for just about everything, and by ignoring Macintosh inter-application communications by using helper applications to pass data from VisualRoute to other applications.

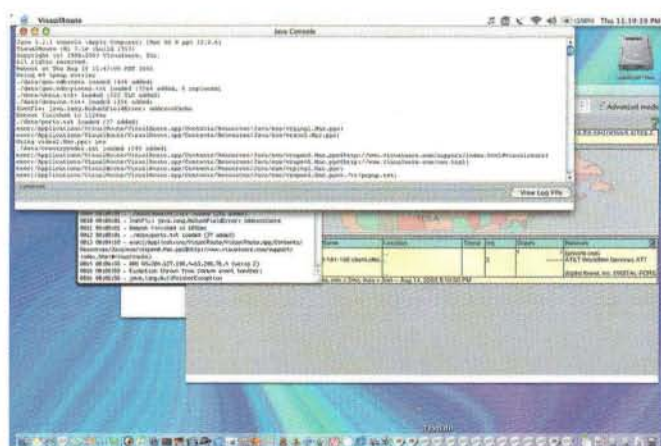
Most inexplicable is the complete lack of keyboard commands within the application. I am not a Java programmer, but a quick web search brought up some examples of command-key coding in Java, with the caveat that with the continuing Balkanization of tools and

technologies between platforms, implementing command keys can be difficult.

While annoying, I talked myself into believing I was just running a very old Macintosh application that did not have key commands. Mousing around so much really got to be frustrating when drilling down on registry lookups and in navigating the application's features.

VisualRoute has two features that cause it to interact with external applications: jumping to a web page and copying looked up information to a text editor. I can appreciate that being a Java application, it might be easier to create a platform-specific helper application to launch a web browser or a text editor, but I have a hard time excusing the fact that VisualRoute does this every time you go to a web page or paste information to a text editor.

For example:



Do not adjust your magazine, the image is correct. This is, in two words, sloppy coding. It took me almost as long to quit all those helper applications as it did for me to use VisualRoute to track down a spam source.

Here's hoping that a future revision of VisualRoute will fix these two glaring issues.

THE BOTTOM LINE

VisualRoute 7.1 is a Java graphical traceroute utility application that provides real-time, graphed displays of traffic information coupled with a geographic map display of the network path. Its core functionality is equivalent to command-line tools such as traceroute, dig, nslookup, ping and mtr. VisualRoute also provides a web server mode allowing for remote use or for use on a DMZ network that is not blocking ICMP traffic. Additional features include mail server MX record lookups and the ability to drill down on DNS and IP address registry information for hosts and addresses. While useful for both new and seasoned network administrators performing network diagnostics, the application is hampered by its lack of keyboard commands and its proclivity to launch multiple instances of supporting applications.

By Ron Davis

Cocoa Recipes for Mac OS X

If you aren't new to the Macintosh and having programmed before there was Cocoa and then you decided early in the history of MacOS X you were going to learn Cocoa, you've probably been to StepWise.com and seen the Vermont Recipes. These were a series of tutorials on how to build OpenStep applications. They were the tutorials you first learned with because Apple had no tutorials, and there were no books on the subject at the time. Now these tutorials have a book of their own. They've been updated and fleshed out by Bill Cheesman and collected in the new book from Peachpit Press, *Cocoa Recipes for Mac OS X: The Vermont Recipes*.

If you are new to the Mac, or are just now deciding to leave the dark ages and learn some Cocoa, this book provides a concrete set of examples of how to make Cocoa applications. Apple's documentation has improved greatly, but if you want a more complete step-by-step approach to developing a complete Cocoa application, this book is there to provide it for you.

The first question you'll probably ask is whether you should buy the book given many parts of it were on the web. Well the Vermont Recipes were based on OpenStep and even when Cocoa first came out there were differences. Now those differences are even greater. The book is the updated version.

The book starts out with some short introductory chapters where it discusses the philosophy of the book. The author wants to go through a real world application and build it a layer at a time. He's not trying to cover every aspect of Cocoa, every call, every API. Instead he is covering the things you really use.

They claim the book isn't a reference book, but it is more the kind of book you open when you need to do a particular thing and look for an example. Sitting down and going through the book one chapter after another will teach you a lot about programming in Cocoa, but you can still get value out of it by pulling it off the shelf when you want to find out how to make a contextual menu or put data in a keyed archive.

The book is organized into seven sections: Building An Application, User Controls, Data Storage, Menus, Windows, Additional Application Features, and Working With Mac OS X 10.2. Each section is broken up into recipes. Some sections have a lot of recipes like User Controls with nine. Some with only one like Data Storage.

Each recipe covers a large topic in the application development cycle. Each recipe is broken up into steps. A step is one set of things you need to add to accomplish the overall recipe. Each step is broken down into sub-steps, which is where the actual code is.

There is a lot of explanation in each step. Each sub-step tells you what you need to do and then shows you the code. Then the

text explains what each piece of code does and means. There are sidebars throughout the book that cover, not the code, but the technology. The first recipe contains sidebars on Model-View-Controller and Dictionaries among others.

The first recipe creates a simple multi-document application complete with saving, icons and deployment builds. It is an introduction to using Project Builder and Interface Builder. It's also 149 pages long. This book is long. While it covers a lot, most of it is the basic stuff. The book just covers all of the basics.

The second recipe builds on the first adding a window with a bunch of buttons. While a somewhat contrived example, it is common to have to add controls as the next step in the developing a document app. Personally I would have created a Preference Window. These always require a bunch of controls. As this section on user controls continues more and more controls are added to the window. Ultimately every possible control is covered before the section ends.

After the really long section on controls there is a really short one covering keyed archiving. Then menus get covered. Not just menus in the menu bar, but contextual menus and dock menus. The fifth section covers windows adding drawers, alerts and dialogs. User preferences and help are covered in the last section before 10.2 only features. The section on 10.2 only features tells how to test for a feature and maintain backwards compatibility.

So what is missing? There is no discussion of toolbars, which I expected when talking about menus. Also there is no discussion of AppleScript or AppleEvents. And while table views are covered under user controls, there is no discussion of the outline view variant. But the book is already 750 pages long; you can't cover everything.

Of course like all computer books this one is dated almost as soon as it gets released. Given the major changes that Pather and Xcode are bringing, some of the things in the book are already in need of changes. Xcode brings a different development environment, and the introduction of Bindings fundamentally changes how Cocoa apps are written and structured. But in order to use bindings the developer is forced to use Pather only, which will limit the adoption of bindings in the near term.

Overall this is a great book for beginners and intermediate Cocoa programmers. It is well written, walking you through everything you need to know. Advanced programmers probably know everything in this book, but still might benefit from having it around to use as a refresher when they need to remember how to do something they don't do very often like dock menus.

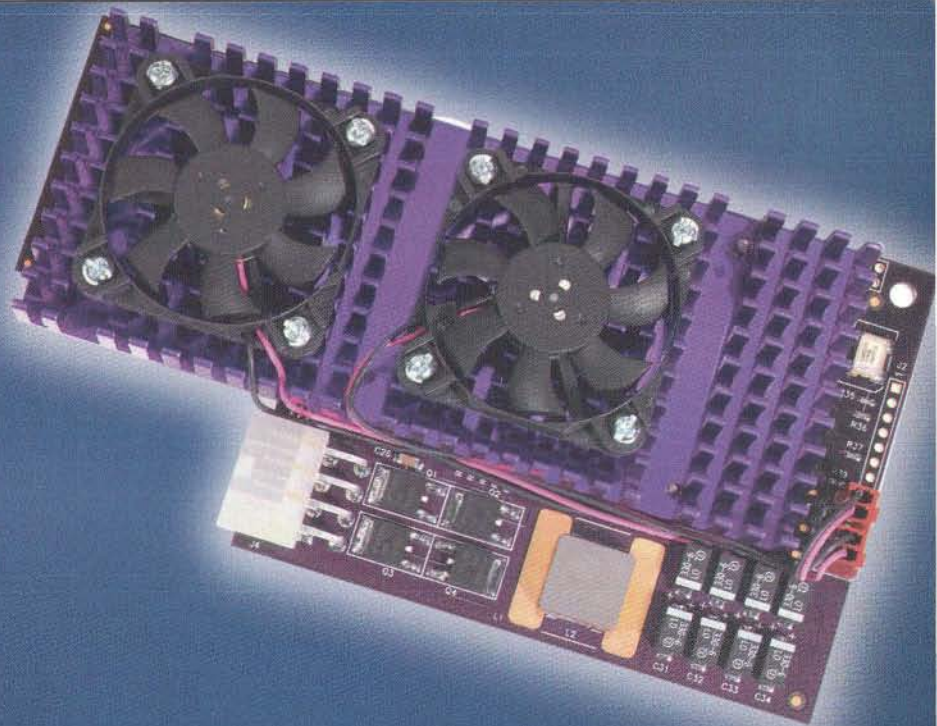
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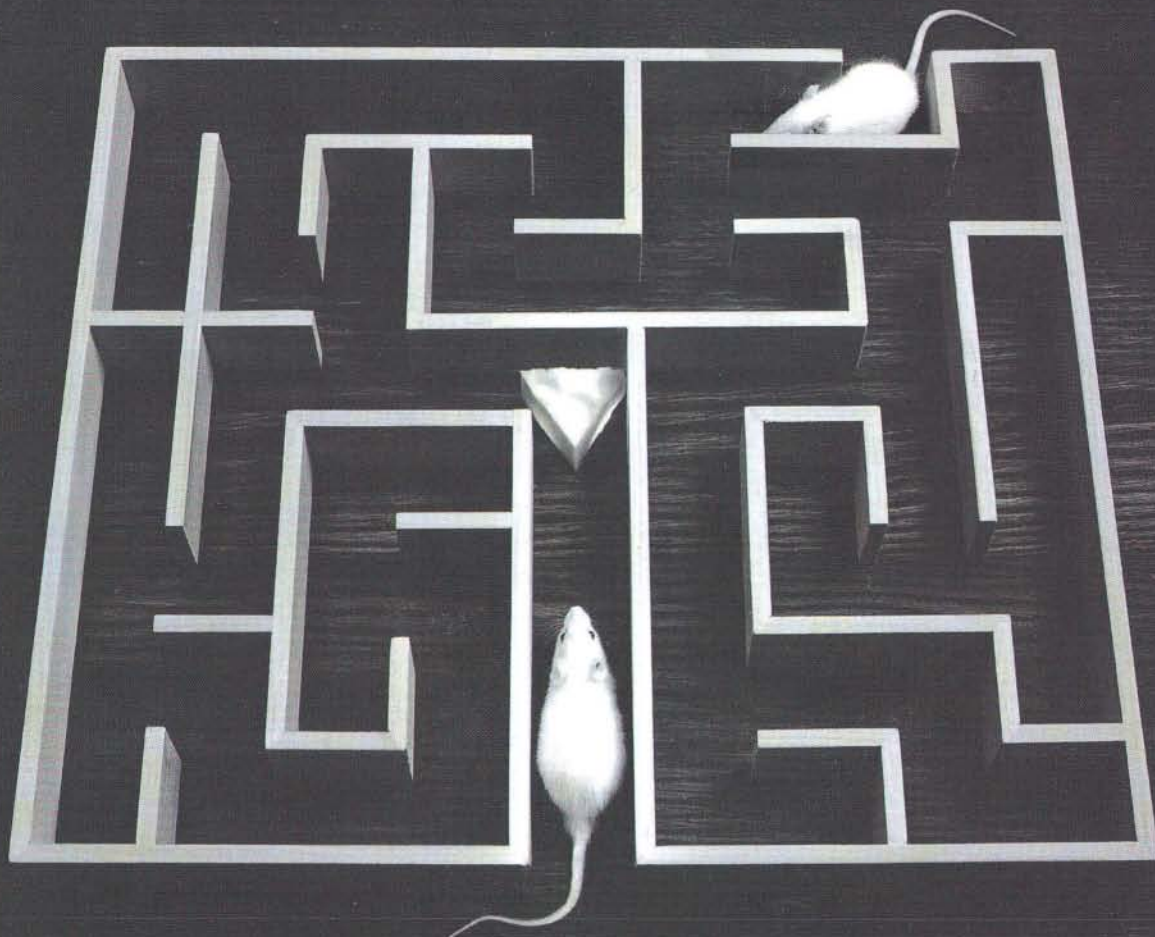
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Trolltech AS	IBC
Utilities4Less.com	67
VVI	35
WIBU-SYSTEMS AG	13

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Big Nerd Ranch • Big Nerd Ranch, Inc.	57
c-tree Plus • FairCom Corporation	1
Developers Library • Pearson Education Communications	53
Development & Testing • Full Spectrum Software, Inc.	31
Disk Utilities • Prosoft Engineering, Inc.	41
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Enterprise Software • MCF Software	27
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piDog Utilities • piDog Software	72
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Software Protection • WIBU-SYSTEMS AG	13
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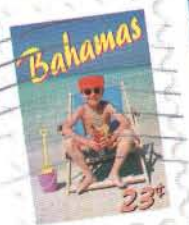
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